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An Examination of the Total Quality Management (TQM)
Concept Given Current Federal/DoD Competition Initiatives

by

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ABSTRACT

Quality is vital to our defense and quality improvement is key to increasing productivity. The Department of Defense (DoD) Total Quality Management (TQM) effort has been given top priority by the Secretary of Defense. Many questions exist concerning the problems encountered when implementing TQM throughout DoD. This thesis looks at the compatibility of the TQM philosophy with current Federal Acquisition Regulation competition requirements. The writer concludes that the TQM philosophy implementation is compatible with existing competition policy.

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I. INTRODUCTION

A. OVERVIEW

This thesis analyzes the interrelationships between two trends of thought affecting how the Government does business. The first trend is the movement towards increased competition in Government procurement. As a result of adverse public opinion, the Competition in Contracting Act (CICA) of 1984 (Public Law 98-369) was passed and ushered in the era of "full and open" competition. It is generally believed by the acquisition community that CICA is the single most significant change in procurement policy to occur since the Armed Services Procurement Act of 1947. The primary Congressional objective in passing CICA was to allow all qualified vendors to compete for agency acquisitions. The term "full and open competition" was carefully selected in part due to Congress' general perception that Government agencies would abuse any flexibility they were given with respect to competition.

The second trend is implementation of Total Quality Management (TQM). In February 1986, President Ronald Reagan signed Executive Order 12552 aimed at making all Federal Agencies more productive by 1992. To achieve the overall productivity goal, the Office of Management and Budget (OMB) has emphasized the implementation of TQM to all agencies of the executive branch. TQM implementation has been directed for the entire Department of Defense (DoD) by the Secretary of Defense.

TQM is an innovative approach to quality control. TQM concentrates on the continuous improvement of all of an organization's processes. Controlling the quality of a supplier's production process is a vital part of implementing the TQM philosophy. The Japanese stress the importance of developing only a small

number of suppliers. This specific principle appears to be in conflict with the general philosophy and policy of competition as espoused in the Federal Acquisition Regulations (FAR) and presently implemented in DoD. Examining this apparent conflict, as well as examining the other relationships between TQM and competition, is the subject area that we will examine in this thesis.

B. SCOPE OF THE EFFORT

This research involves the collection of relevant data concerning procurement competition regulations and the management principles of TQM, in order to determine the extent of the compatibility between the two. This study includes the identification and examination of basic elements of existing competition regulations, primarily laid out in the FAR. Other important information concerning competition will be drawn from studies of the implementation and effects of CICA, this law being the basis for nearly all the current competition guidelines.

The identification and examination of the basic principles of TQM are of equal importance to this study. These principles are extracted from the generally accepted concepts of noted TQM experts. Included in this list of experts are W. Edwards Deming, Joseph M. Juran, Philip B. Crosby, Armand V. Freigenbaum, William W. Scherkenbach and Genachi Taguchi, among others.

C. RESEARCH QUESTIONS

In light of the issues discussed above, the primary research question for this study is: What are the key interrelationships between Total Quality Management and competition and how do we pursue each in light of these interrelationships?

The subsidiary research questions are as follows:

1. What principles are the basis for the management concept of TQM?

2. What are the current Federal and DoD competition regulations and what was the Congressional intent behind them?

3. Where would the adoption of the TQM philosophy enhance the objectives of currently mandated Federal and DoD competition directives?

4. Where would the adoption of the TQM philosophy co-exist without enhancing nor conflicting with the objectives of currently mandated Federal and DoD competition directives?

5. Where would the adoption of the TQM philosophy conflict with the objectives of currently mandated Federal and DoD competition directives?

6. What approach should be taken by DoD to implement the TQM philosophy in light of the relationships between TQM and competition?

7. How might DoD adjust policy or acquisition strategy to better accommodate TQM and competition?

D. METHODOLOGY

This research will be conducted using three methods:

1. A comprehensive review of current literature to collect relevant data concerning competition and the management principles of TQM.

2. Interviews with DoD TQM proponents, acquisition and quality assurance experts, and competition advocates to obtain current observations and insights concerning the effects of competition and the observed or anticipated effects of TQM implementation.

3. Interviews with TQM proponents, acquisition and quality assurance experts, and advocates of competition in private industry, to provide similar observations and insights. This last method is important because a considerable number of private firms, including nearly all the firms in the internationally competitive electronics and automotive industries, are years ahead of the Government in implementing TQM.

E. ASSUMPTIONS AND LIMITATIONS

1. Summary of Assumptions

- The key elements of competition in federal acquisition exist and can be readily identified.
- Universally accepted principles of TQM exist and can be identified.

2. Summary of Limitations

With respect to the competition aspect of this study, this thesis will be limited primarily to the evaluation of DoD procurement policy with respect to competition among suppliers. Elements of competition within current Federal regulation will be examined and compared to TQM principles. Elements, as used here, are simply "elemental" or basic characteristics of the current competition requirements.

With respect to the total quality management aspect of this study, generally accepted principles of TQM will be examined. These principles are not scientific in nature, and in the scientific sense have not been validated. They are, however, the conceptual tools used by a majority of total quality management experts. We will examine the technical aspects of TQM, such as the specific methods of Statistical Process Control (SPC) or Just-in-Time (JIT) inventory techniques, only to the extent that this examination may add to the reader's understanding of an individual TQM principle or a specific principle's relationship to the acquisition process. Specific philosophies of the leading TQM proponents will not be enumerated, such as Deming's "fourteen points" and "seven deadly sins." These topics have been adequately covered in published literature.

Since most books and articles on TQM address production processes, referenced material will generally relate more to supply contracts than service

contracts. However, unless expressed otherwise, the observations and recommendations made concerning supply contracts will also apply to service contracts.

The analysis provided as Chapter VI of this thesis compares twelve elements of competition with fourteen principles of TQM. In order to address each possible interaction between the identified elements and principles, 168 interrelationships are examined. In order to cover this material in a reasonably concise manner, this researcher will provide a more detailed analysis for an interrelationship with more significant compatibility or incompatibility, and less detail for less significant compatibility issues.

F. ORGANIZATION OF STUDY

Chapter II provides a background into the FAR competition requirements. Chapter III provides a brief historical background into TQM and discusses U.S. industry and DoD implementation of the philosophy. Chapter IV provides a listing and a description of key competition elements compiled from readings, research and interviews. Chapter V is a presentation of the principles of TQM extracted from readings, research and interviews. Chapter VI is a presentation the analysis and comparison of competition elements and TQM principles. Chapter VII presents the conclusions and recommendations that resulted from this study.

II. COMPETITION IN FEDERAL AND DOD GOVERNMENT CONTRACTING

Competition is a basic cornerstone of the free enterprise system.

-Frank C. Carlucci
Acquisition Initiative #32, 1981

A. BACKGROUND

The concept of competition is quite simple. The Webster Dictionary definition of the word "competition" is "the effort of two or more parties acting independently to secure the business of a third party by offering the most favorable terms." (Merriam-Webster, Inc. 1989, 268) For the purposes of this thesis this is a surprisingly adequate description of competition. This definition is also identical to, for all practical purposes, the historical and present, generally accepted meaning of competition in the acquisition community.

Competition is generally thought to lower prices, strengthen the industrial base, and increase public confidence in the integrity and fairness of our system of Government procurement (Martin 1980, 12). The legal mandate for competition in Federal procurement is not new. Competition, as a legislative requirement, was established in 1809 via U. S. Statute 536 (Coy 1986, 14). The foundation for our present Federal acquisition system was laid in 1947. As explained by William Gates, Adjunct Professor of Economics at the Naval Postgraduate School:

With regard to procurement regulations, the Armed Services Procurement Act of 1947 [ASPA] was the first formal unified defense procurement policy. This Act specified that whenever appropriate, the services should advertise requirements to competing suppliers ... (Gates 1989, 2)

The ASPA established the formal advertising method as the preferred method of procurement. The act authorized negotiation of contracts (without formal advertising) only under 17 exceptions. The standard for competition under ASPA was whether the procuring agency received a minimum of two bids for a given procurement. Despite the preference for competition via the formal advertising method, over time the exceptions became the rule and increasingly activities were negotiating sole source procurements. (Bruns 1987, 3) In the early 1980s, there was an air of dissatisfaction in Congress over the increasing use of sole source contracts. Most politicians believed that many more qualified firms should be allowed to compete for DoD requirements. Also, there was a general perception that premiums were being paid, above fair and reasonable prices, for the convenience of DoD using contractors known by Government personnel, because those contractors had performed under prior contracts for the same or similar goods or services. This air of dissatisfaction in Congress provided the atmosphere for change.

B. LEGISLATING COMPETITION

Although the competition issue has been around for a long time, it probably has never been a more contentious issue than it was in the early 1980s. As explained by author Stanley N. Sherman of George Washington University:

It is not an overstatement to say that the 98th Congress of the United States [1983-84] generated a horn of plenty with its activities in the procurement area. Congress-watchers enumerated at least one hundred-fifty separate procurement-related bills introduced during its sessions. Many of those bills were the subject of hearings and prolonged discussions generated by constant media reports of deficiencies in the government procurement system. This plentiful supply of legislative proposals contained many duplicate and contradictory initiatives. One theme seemed to emerge from this activity: Congress believed that more effort was required to obtain competition in procurement. (Sherman 1985, 118)

The "constant media reports" included examples of spare parts overpricing, disproportionate end of the year spending, and other apparent cases of waste, fraud and abuse. The increasing size of the defense budget coupled with the poor competition statistics being reported by the individual services only strengthened Congress' resolve that legislation was needed to solve the problems in the Federal acquisition process.

As a result of this adverse public opinion, the Competition in Contracting Act (CICA) of 1984 (Public Law 98-369) was passed, amending Title 10 of the United States Code. As stated in CICA:

The Congress finds that in order to ensure national defense preparedness, conserve fiscal resources, and enhance defense production capability, it is in the interest of the United States that property and services be acquired for the Department of Defense in the most timely, economic, and efficient manner. It is therefore the policy of congress that ... full and open competitive procedures shall be used by the Department of Defense... (Public Law 98-369 1984)

It is generally believed that CICA is the single most significant change in procurement policy to occur since the Armed Services Procurement Act of 1947 (Bruns 1987, 3). Besides ushering in the era of "full and open" competition, CICA also institutionalized competition advocacy programs and strengthened protest procedures for contractors who felt a contract was not sufficiently competed (Sherman 1985, 118-120).

It is important to understand the intent of Congress in passing CICA. Although the procurement scandals of the early 1980s may give us another impression, "CICA is not legislation about reducing the costs of goods and services procured by the Federal Government." (Stewart 1987, 17) CICA is about allowing all qualified vendors to compete for agency acquisitions (Coy 1986, 20).

The intent of Congress was made clear when hearings were held and Government agencies suggested the use of terms such as "effective" or "meaningful" competition. The agencies argued that this would allow them to do a better job of lowering prices. However, knowing these terms would also limit the bounds of competition, Congress intentionally used the term "full and open" competition because of their general perception that the agencies would abuse any flexibility given in the matter. (Coy 1986, 20)

Current Federal Acquisition Regulation (FAR) coverage concerning competition stems primarily from CICA, although other laws were passed in 1984 to augment CICA. These laws included the Defense Procurement Reform Act of 1984 (Public Law 98-525) and the Small Business and Federal Procurement Competition Enhancement Act of 1984 (Public Law 98-577). (The Competition Handbook 1987, 3)

C. INSTITUTIONALIZING COMPETITION: OFPP AND DOD PROCUREMENT POLICY

Although CICA formalized Congress' intent to increase competition, the concept that competition was needed to enhance Federal procurement was widely held in the Executive Branch and in DoD. In fact, action to increase competition was aggressively being pursued by the President, the Office of Federal Procurement Policy (OFPP) and the Secretary of Defense before the inception of CICA.

Prior to Congressional action to increase competition in Government procurement, President Reagan had signed Executive Order 12352 on 17 March 1982, directing the pursuit of competition in the Executive Branch. Reagan also issued a Presidential Memorandum on August 11, 1983, reiterating that: "Competition is fundamental to our free enterprise system ... I call upon each of

you to assure that competition is the preferred method of procurement in your departments and agencies." (Reagan 1983)

Also prior to the enactment of CICA, the recently established Office of Federal Procurement Policy was writing a policy regulation to revise the preference for, and exceptions to, the formal advertising method. The language in CICA limiting the exceptions to full and open competition was actually taken from an OFPP draft of this policy. (Coy 1986, 25)

However, even prior to the President's memorandum and OFPP's action, possibly the strongest action was taken within the DOD by then Deputy Secretary of Defense Frank Carlucci. Beginning in 1981, Carlucci's policy letter "Acquisition Initiative #32, Increase Competition in the Acquisition Process," established competition as the principal focus of DOD procurement for the 1980s. (Bruns 1987, 1)

The services were quick to respond to these policy directives for increased competition. The Navy created a highly visible and effective competition program in 1982 and shortly thereafter established a flag level position called the Navy Competition Advocate General. This program became the model for the other services.

Using the Navy as an example to demonstrate the turnaround started by Carlucci and mandated by CICA, competition statistics are provided in Tables I and II. These statistics are taken from the Navy's Fiscal Year 1990 Annual Report on Competition. (Hauenstein 1991, 6) During FY 1982 the Navy was competing less than 30% of its contract actions, an amount which represented less than 27% of Navy procurement dollars. (Platt 1986, I-2, I-3)

Similar dismal competition statistics existed throughout DoD and other Executive Agencies. These statistics, of course, were pointed to in the numerous media reports as factual evidence of the need for change in the Government

**TABLE I - PERCENTAGE OF NAVY CONTRACT ACTIONS
AWARDED COMPETITIVELY (FY 82-90)**

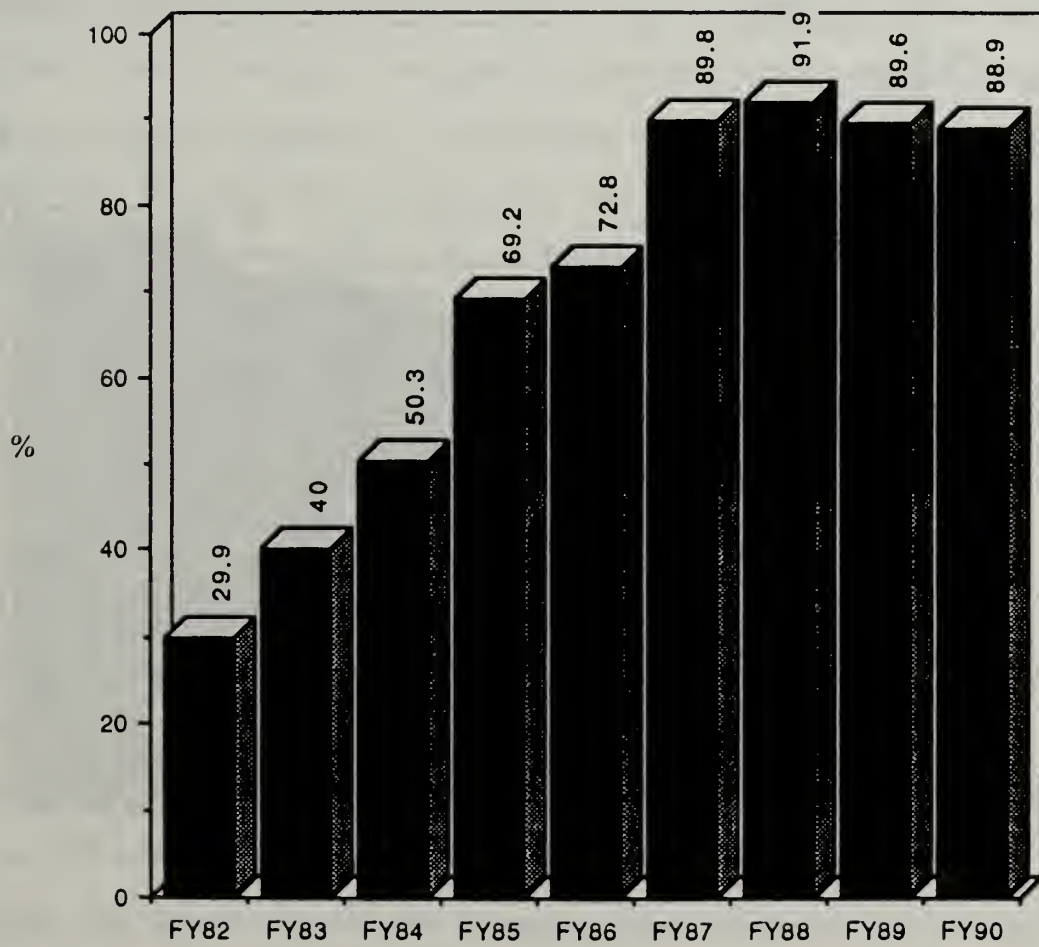
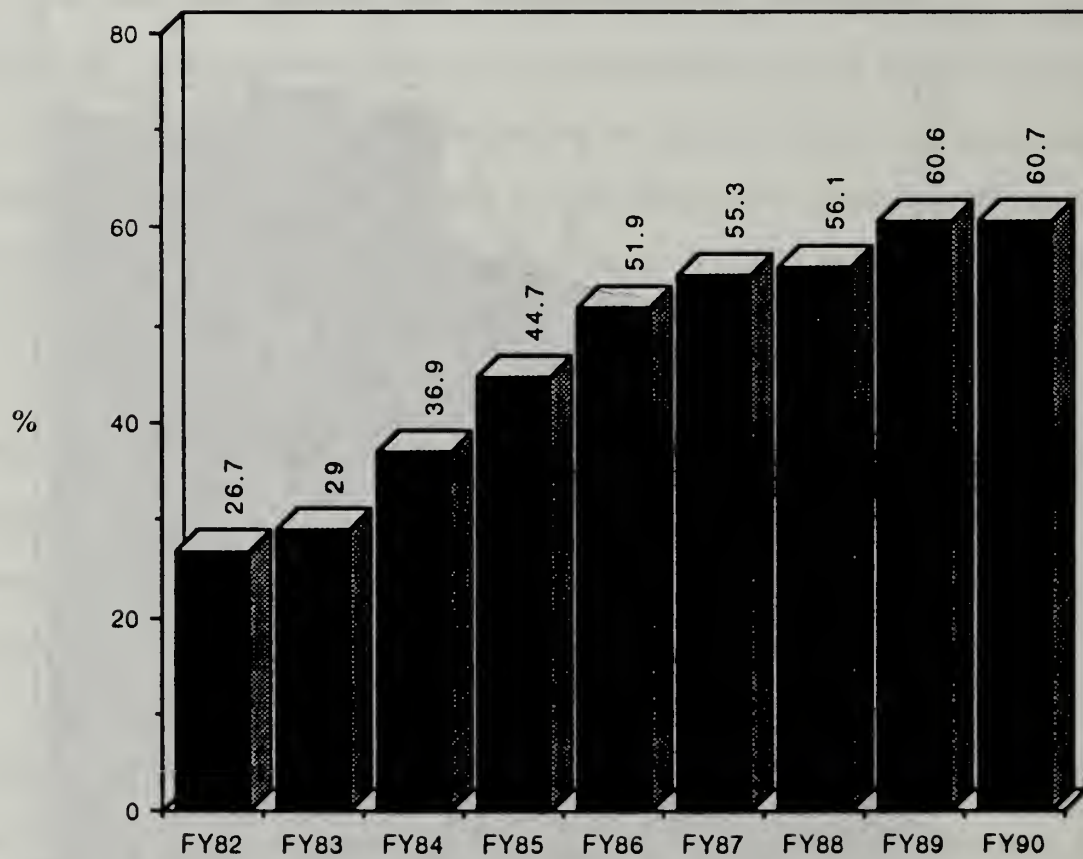


**TABLE II - PERCENTAGE OF NAVY CONTRACT DOLLARS
AWARDED COMPETITIVELY (FY 82-90)**



procurement system. As Everett Pyatt, Assistant Secretary of the Navy, explained to Congress in the Navy's Fiscal 1988 Annual Report on Competition:

Competition as a dynamic business strategy has become fully institutionalized in Navy acquisition. Procurement planners look to competition first in contracts, large or small, to provide that critical edge necessary to maintain our national defense in today's highly resource constrained environment. (Pyatt 1988)

The dramatic improvement for the Navy mirrors that of the other DOD components over the last nine years. However, it is too simple to attribute all the increases in the percentage of competitively awarded actions and procurement dollars to increased awareness. These increases also occurred during the Reagan buildup and its aftermath. During this time period many major system acquisition programs received increased funding and contracted for more end units. As a result, it became cost effective to bring on second sources, whereas in a more austere funding environment, it may have been much more difficult to radically increase competition.

D. SUMMARY

This chapter provided a background into FAR competition requirements. There are two important points to take from this chapter. First, speaking in general terms, competition is good. It is believed to lower prices, strengthen the industrial base and increase public confidence in the Government acquisition system. Second, CICA was passed for the primary purpose of allowing all qualified suppliers to compete for Government requirements, and as a result competition as a business strategy has been institutionalized in Federal acquisition.

III. TOTAL QUALITY MANAGEMENT

A quiet revolution called Total Quality Management (TQM) is underway in the world. It will change our lives as much as the advent of mass production early in this century. ...the future of our country literally hinges on our ability to change quickly to the TQM process and improve it.

-T. R. Stuelpnagel, Business
Forum, Fall 88/Winter 89

A. PURPOSE

The purpose of this chapter is to provide a background into the evolution of quality control to assist the reader in the understanding of quality and Total Quality Management (TQM), and to identify and discuss individual TQM principles.

B. DEFINING QUALITY

Definitions of quality abound, however, there is no universally accepted definition of quality at the present time. The most extensive effort to examine the numerous approaches to defining and, therefore, understanding the components of quality are found in the book Managing Quality and in published papers written by David A. Garvin. Yet, even Garvin explains: "Quality is an unusually slippery concept, easy to visualize and yet exasperatingly difficult to define." Garvin lists numerous definitions of quality under five descriptive categories. A sampling of his definitions are shown in Table III. (Garvin 1988, xi)

TABLE III - FIVE DEFINITIONS OF QUALITY

I. Transcendent Definition:

- "Quality is neither mind nor matter, but a third entity independent of the two ... even though quality cannot be defined, you know what it is."

(R. M. Pirsig, Zen and the Art of Motorcycle Maintenance, pp. 185, 213)

II. Product-based Definition:

- "Differences in quality amount to differences in the quantity of some desired ingredient or attribute."

(L. Abbott, Quality and Competition, pp. 126-127)

III. User-based Definition:

- "Quality consists of the capacity to satisfy wants ..."

(C. D. Edwards, "The Meaning of Quality," *Quality Progress*, October 1968, p. 37)

- "Quality is fitness for use."

(J. M. Juran, Quality Control Handbook, p. 2-2)

IV. Manufacturing-based Definition:

- "Quality [means] conformance to requirements."

(P. B. Crosby, Quality is Free, p. 15)

V. Value-based Definition:

- "Quality means best for certain customer conditions. These conditions are (a) the actual use and (b) the selling price of the product."

(A. V. Feigenbaum, Total Quality Control, p. 1)

Garvin also identifies what he believes are the components of quality. His list includes:

- | | |
|----------------|----------------------|
| 1) Performance | 5) Durability |
| 2) Features | 6) Serviceability |
| 3) Reliability | 7) Aesthetics |
| 4) Conformance | 8) Perceived Quality |

The Federal Acquisition Regulation (FAR), Part 46, titled Quality Assurance, does not specifically define "quality." However, the definition can be inferred from other definitions provided in FAR. For example, the definition of "Government contract quality assurance" is given as "the various functions, including inspection, performed by the Government to determine whether a contractor has fulfilled the contract obligations pertaining to quality and quantity." (FAR 46.101) The definition of "contract quality requirements" is given as "the technical requirements in the contract relating to the quality of the product or service and those contract clauses prescribing inspection, and other quality controls incumbent on the contractor, to assure that the product or service conforms to the contractual requirements." (FAR 46.101) Both of these definitions indicate that for the Federal Government quality involves meeting the contract requirements.

There is a generally accepted concept of quality among TQM proponents. It looks at quality as meeting the customer's immediate need for the product and also considers customer's increasing satisfaction in using the product. (Stuelpnagel 1988, 59)

The same definition more succinctly stated:

Quality is conformance to your customers' requirements. Customers' requirements include functionality, price, availability, timeliness, and

reliability. Your product is a quality product if it meets the customers expectations; if it doesn't, it's not. (Control Data (undated), 3)

Note that the TQM and Government (FAR) definitions of quality are very different. The implications of these two different definitions of quality will be discussed later in this thesis.

C. THE EVOLUTION OF QUALITY CONTROL

Garvin (1988) believes since the advent of mass production and the use of interchangeable parts, our understanding of quality has evolved. He states that quality control has progressed through the following four eras:

1. Inspection Era

This period covered the 18th and 19th centuries through the early 1900s. Emphasis during this era was on the uniformity of parts, the conformance to the standard. Inspection was to be an objective and verifiable process and concentrated on the accuracy of measurement. Inspection was normally done at the end of the line on each item produced. (Garvin 1988, 3-21)

2. Statistical Quality Control (SQC) Era

This era began around the time Walter A. Shewhart's contributions were published in 1931. Shewhart proved that variability was a fact of industrial life and that it could be understood using the principles of probability and statistics. (Garvin 1988, 3-21)

Shewhart ... developed techniques to bring industrial processes into what he called "statistical control." Shewhart had defined the limits of random variation in any aspect of a worker's task, setting acceptable highs and lows, so that points outside those limits could be detected and the causes studied. Workers could be trained to do this charting themselves, giving them greater control over their jobs and allowing them to make adjustments on their own, Shewhart's genius, Dr. Deming would often say, was in recognizing when to act and when to leave a process alone. (Walton 1988, 7)

The use of sampling techniques and acceptable quality levels (ranges of acceptance or rejection of lots) became widespread in the 1940s. This era lasted roughly through the mid-1950s. (Garvin 1988, 3-21) Shewhart and Statistical Quality Control (SQC) will be discussed in more detail later in this chapter.

3. Quality Assurance (QA) Era

This era (roughly mid-1950s to the end of the 1960s) encompassed the emergence of much more sophisticated quality control concepts. The titles of some of these concepts, with the dates initial books were published on them, include: Costs of Quality (1951), Total Quality Control (1956), Reliability Engineering (1957), and Zero Defects (1961-62). Emphasis during this period turned towards the prevention, rather than the detection of defects. (Garvin 1988, 3-21)

During this period many of the TQM methods had been refined, however, quality assurance was still considered the job of a few experts in one department or division of a manufacturing company.

4. Strategic Quality Management Era

The current era (1970-91) began when the world's businesses realized that quality management is an effective competitive tool in the marketplace and is worthy of inclusion in top management's strategic planning. This idea is made clear by Dr. Deming (1981), as he dispels what he called American "folklore," that "quality and production are incompatible: that you can't have both."

The fact is that quality is achieved by improvement in the process. Improvement of the process increases uniformity of output of production, reduces mistakes, reduces waste of manpower, machine-time, and materials.

Reduction of waste transfers man-hours to the manufacture of additional good product. In effect, the capacity of a production-line is increased. The benefits of better quality through improvement in the process are thus not just better quality, and the long-range improvement of

market-position that goes with it, but greater productivity and much better profit as well. Improved morale of the workforce is another gain: they now see that the management is making some effort themselves, and not just blaming all faults on the production-workers. (Deming 1981/82, 12-13)

This era is also marked by the evolution and refinement of what is more commonly referred to as Total Quality Management (TQM). Total Quality Management is the subject of the remainder of this chapter.

D. DEFINING TOTAL QUALITY MANAGEMENT

"TQM" is the most accepted term in the U. S. for a quality movement currently in progress throughout the world. The title TQM is generally equivalent to the management philosophies identified as "Total Quality Control (TQC)," as originated by Armand Feigenbaum (Feigenbaum 1956, 94, 98); "Company Wide Quality Control (CWQC)," as used primarily by the Japanese; and "Strategic Quality Management," as used by David A. Garvin. (Garvin 1988, 190). These titles hint at the evolving meaning of TQM.

Control Data describes their Total Quality Management Process as a "... corporate-wide problem-solving and process-improving methodology ... a disciplined approach for management and employees to manage quality." (Control Data (undated), 11)

Total Quality Management (TQM) is a management philosophy with the goal of continuous process improvement that "embraces a broad range of humanistic, business, and technical elements..." (Stuelpnagel 1988/89, 4).

The Department of Defense defines TQM as:

... (an) initiative for continuously improving (DoD's) performance at every level, in every area of DoD responsibility. Improvement is directed at satisfying such broad goals as cost, quality, schedule, and mission need and suitability. TQM combines fundamental management techniques, existing improvement efforts, and specialized technical skills under a rigorous disciplined structure focused on continuously improving all DoD

processes. It demands commitment and discipline. It relies on people and involves everyone. (DoD TQM Pamphlet (undated), 1)

The following are four critical points encompassed in TQM:

1. These philosophies emphasize that the quality management function moves from being the responsibility of the Quality Assurance Department, to being the responsibility of top management. It also means that the job of controlling quality is everyone's responsibility.

2. Quality is not defined by marketing personnel, design engineers, manufacturing supervisors or quality inspectors. Quality is defined through the eyes of the consumer and ultimate user. The company must understand consumer needs and all company functions must be coordinated to meet the needs of the consumer.

3. Continuous improvement of all processes is the key to the management of quality. The measurement and control of the variation in processes is called Statistical Process Control (SPC). Training in its application, analysis of resulting data and systematic improvement must occur throughout the entire company .

4. The last point, and "the most radical departure of all" from our present understanding of quality, is the realization "that quality [should] be viewed as an aggressive competitive weapon." (Garvin 1988, 21) Companies and whole industries are threatened by the loss of markets to foreign competitors who are producing higher quality products and doing so with higher productivity and lower costs.

The Department of Defense (DoD) definition of TQM is provided by Jack Strickland, Director for Industrial Productivity and Quality, Office of the Assistant Secretary of Defense (Production and Logistics):

Continuous process improvement activities involving everyone in an organization - managers and workers - in totally integrated efforts toward improving performance at every level. This improved performance is directed toward satisfying such cross-functional goals as quality, cost, schedule, mission need and suitability. Total quality management integrates fundamental management techniques, existing improvement efforts and technical tools under a disciplined approach focused on continuous process improvement. These activities are ultimately focused on increased customer/user satisfaction. (Strickland 1989, 18)

Although most success stories involve industrial applications, the scope of TQM is much more broad. As Jack Strickland states TQM applies to:

"... every requirement process, every design process, every development process, every manufacturing process, every quality assurance process and, not insignificantly, every paperwork and administrative process." (Strickland 1989,18)

E. THE HISTORY OF TQM

The development of TQM may be chronologically divided into three periods. The first is called the Shewhart Period, the second the American Exportation Period and third the Japanese Period.

1. The Shewhart Period

The theories that became the cornerstone of what today is called TQM, were developed in the 1920s and 1930s by Walter A. Shewhart, a statistician at Bell Laboratories. As explained by Mary Walton in her book on W. Edwards Deming:

Shewhart ... had developed techniques to bring industrial processes into what he called "statistical control." Shewhart had defined the limits of random variation in any aspect of a worker's task, setting acceptable highs and lows, so that any points outside those limits could be detected and the causes studied. Workers could be trained to do this charting themselves, giving them greater control over their jobs. Shewhart's genius, Deming would say, was in recognizing when to act and when to leave the process alone." (Walton 1988, 6)

Shewhart's theories were called Statistical Quality Control (SQC). The publication of Shewhart's Economic Control of the Manufactured Product in 1931 has been called the "watershed for the quality movement." (Garvin 1988, 3)

SQC had little impact outside the Bell System until World War II (WW II). During WW II the War Department Quality Assurance organization was staffed by statisticians from Bell Labs. These technicians wanted to establish adequate quality standards for the sampling of munitions received from industry. In 1942, Acceptable Quality Levels (AQLs) were created for sampling of munitions to ensure the appropriate quality level in munitions received. Also in WW II, the War Production Board set up training courses in conjunction with major universities to educate the war supporting industries in SQC procedures. The first program was taught by the Carnegie Institute of Technology in 1941, the second by Stanford in 1942. (Garvin 1988, 10-11)

While Garvin and Walton agree that SQC did not take hold with U. S. industry after the war, they disagree over the actual number of industry personnel trained in these sessions during the war and exactly why the training did not take hold. Garvin claims 8,000 industry personnel were trained and the procedures did not catch on because "most early trainees made little effort to apply the techniques they had learned." (Garvin 1988, 11) Walton states that "Deming and others taught Shewhart's SQC procedures to 31,000 industry workers in support of procurement of war supplies." (Walton 1988, 7) She reasons that after the American war effort, America enjoyed such a dominance of the world markets that U. S. industry pushed for production quantity over quality. At this time in history, Frederick Winslow Taylor's time-and-motion studies were in vogue with American management and SQC procedures were considered too time consuming and unnecessary. (Walton 1988, 7)

2. The American Exportation of SQC to Japan

W. Edwards Deming, Joseph M. Juran and Armand V. Feigenbaum lectured world-wide after World War II as quality experts. However, the most dramatic and consequential effect of exporting SQC was on one country, post-war Japan.

a. Civil Communication Section

Although most writers give credit for exporting SQC to Deming and Juran, Garvin cites the Allied Command, Industrial Division, Civil Communication Section (CCS), as providing the earliest counsel to the Japanese after WWII. As part of the post-war reconstruction, the CCS was tasked with bringing Japan's telephone system up to world class standard. In Garvin's words:

Between 1945 and 1949 these [CCS] engineers pursued such varied activities as upgrading Japanese working conditions ... and advising Japanese business leaders on production management. This last need was especially acute, and in 1949-50 it led to the now famous CCS seminars. These were courses on industrial management, lasting eight weeks, to which only (newly appointed) top executives in the communication industry were invited. They were offered by the CCS twice - once in Tokyo and once in Osaka - but proved so popular that they were reinstituted under Japanese leadership when the Allied command was disbanded and continued for twenty-four more years. (Garvin 1988, 184)

Garvin points out that the training, initiated and provided by the CCS engineers to the Japanese, covered the principles of Scientific Management, emphasized factory operations and strongly stated that the primary objective of the company was to produce a quality product. The training also covered quality control practices and techniques. Ironically, the participative and "bottoms-up" management approaches, now considered "Japanese," were covered in these influential classes. (Garvin 1988,185)

b. W. Edwards Deming

W. Edwards Deming had originally become familiar with Shewhart by consulting with him concerning statistical methods in the 1930s. At the time Deming worked at the Department of Agriculture. Deming was a holder of a Doctorate in Physics and was studying the effects of nitrogen gas on crops. Deming also had the opportunity to study statistics with Ronald Fisher, the famous British statistician, and quickly became better known for his ability in the area of statistics rather than physics. (Walton 1988, 7)

Dr. Deming was given two opportunities in the 1940s to use Shewhart's statistical controls in order to enhance quality. The first opportunity came when he was asked to take charge of the new sampling program for the 1940 U. S. census. In this successful application, Dr. Deming was also able to demonstrate that statistical controls could be used in clerical as well as in industrial operations. The second opportunity, previously mentioned, was instructing for the War Production Board sponsored industry training in SPC conducted through Stanford during WW II. (Walton 1988, 7)

In 1947, Deming was "asked to join a statistical mission planning the 1951 Japanese census." (Walton 1988, 8) Towards the end of this first visit to Japan, he had the opportunity to meet the members of Japan's Cabinet Bureau of Statistics.

Some Americans, on loan from Bell Labs as part of the rebuilding effort, thought that the Union of Japanese Engineers and Scientists (JUSE) might do well to study Shewhart. In doing so the JUSE members read that Deming had studied with Shewhart. Some of the members remembered Deming from his 1947 visit to Japan. JUSE invited Deming back. He returned to Japan in June 16, 1950, to lecture workers, plant managers, and engineers on quality control measures. Due to the negative experience of observing SQC's failure to take

hold in the U.S. after the war (which Deming blamed on higher management, not the worker), Deming also lectured the Kei-dan-ren, an association of Japan's chief executives. (Walton 1988, 9-15)

To show their appreciation to Dr. Deming, the Japanese named the award in their annual national quality competition "the Deming Prize" in 1951. In 1960, Prime Minister Kishi awarded Dr. Deming the Second Order of the Sacred Treasure - the first American to receive such an honor. (Walton 1988, 15)

c. Joseph M. Juran

The Japanese also invited Joseph M. Juran to lecture in 1950. Juran, also an American, was the author of the Quality Control Handbook, published in 1951 and considered the "profession's bible." (Garvin 1988, 12) Juran had also worked with Shewhart's group at Bell Labs after the inception of SPC. While Deming had emphasized the statistical aspects of quality control, Juran's teachings addressed quality control more from an organizational standpoint. "Juran ... teaches a system of management intended to put a plant or a corporation on a path to improving quality year by year." (Main 1986, 31)

d. Armand V. Feigenbaum

The last of these three quality consultants to lecture in Japan was an engineer named Armand Feigenbaum. He published an 851-page textbook, Total Quality Control, in 1956. Feigenbaum argued that the same statistical and engineering methods applied to quality control with respect to production, should be used throughout a company (Main 1986, 34). His book provided less theory and more "how to" information. For this reason, his approach became the model for the quality movement in Japan.

Feigenbaum explains in his book:

The underlying principle of this total quality view is that... to provide genuine effectiveness, control must start with design of the product and end only when the product has been placed in the hands of a customer who remains satisfied.... ... the first principle to recognize is *that quality is everybody's job*. (Feigenbaum 1956, 1)

3. The Japanese Development Period

The third and most often cited period in the history of Total Quality Management also dates back to postwar Japan. After the devastation of World War II, the national focus in Japan was the attempt to return to the world market place and their previous standard of living. Through their commitment to quality improvement, Japan wished to erase the world's perception of Japan as the producers of "cheap" and "shoddy" goods. This perception existed prior to the war and was prevalent for years after the war. Using the American training as a catalyst, the Japanese addressed quality improvement with the same tenacity they had when they fought in WW II. (Stuelpnagel 1988, 5) The Japanese proceeded to train 20,000 engineers in rudimentary statistical methods within 10 years after being introduced to Deming and the other American quality experts. (Walton 1988, 9-15)

Modern American author's descriptions of the TQM philosophy are based on observations of the ingenious Japanese adaptation of American statistical methods and management theory to their culture, management style and national institutions.

They [the Japanese] have proven Deming's concept that the drive for higher quality will reduce cost, cut delivery time and capture increased market share - thereby producing more jobs and wealth. Using this process, the Japanese have demonstrated to the world that people without the blessings of natural resources can win the industrial race." (Stuelpnagel 1988/89, 5)

The Japanese took the American theory of quality management and made it a reality. They also subjected that theory to continuous improvement, and in

Garvin's words "ultimately developed a quality movement that was uniquely their own." (Garvin 1988, 184) The Japanese still refer to TQM more often as "Total Quality Control," which is an indicator of the influence of Feigenbaum's book of the same title. Japanese TQM is often referred to as "Japanese management" in the international press. This label gives deserving consideration of the Japanese contribution to the TQM concept.

F. THE ADOPTION OF TQM IN THE U. S.

Change is something that large organizations resist. Researchers have concluded that organizations undertake change only if there is a perceived benefit or a perceived threat or crisis that entices them to change. (Johnston 1989, 35-36) What then is causing U. S. industry and the Government to undertake the changes required by TQM?

1. Industry

There is little doubt about what is behind the U. S. industry's recent interest in higher quality. As explained by quality consultant Phil Crosby:

I have had hundreds of discussions with operating managers over the years and can state absolutely that their interest in quality is proportional to the amount of profit-deteriorating situations they are experiencing at that exact moment. (Crosby 1979, 15)

As explained by Garvin, profit-deteriorating conditions are evident on three fronts in the U. S. First, there has been a sharp jump in product liability suits. Second, there is increasing pressure from the U. S. Government to make industry pay for their mistakes, as evidenced by "recalls" and the enactment of "lemon laws." The third profit-deteriorating condition, and the "rudest awakening" for U. S. business, is foreign competition, particularly, "the dramatic inroads" being made by "Japanese manufacturers because of their superior quality and reliability." (Garvin 1988, 21)

The automobile and electronics industries in the United States have been among the first to recognize the potential of the Japanese management system. These industries faced the survival issue several years ago, established the need for TQM, and proceeded to get underway. Their approach also includes partnership arrangements with Japanese companies located both in Japan and the United States. (Stuelpnagel 1988/89, 5)

Many U. S. companies decided the fastest way to learn about what the Japanese were doing right was to form a joint venture with a Japanese firm. Much is being learned from joint ventures, in particular from the Japanese plants in the U.S. They are demonstrating, for example, that the causes of increased productivity/quality are not just due to the quality of machinery or the work force, but to better management of quality.

Ironically, Deming and the TQM movement were not really "discovered" by smaller firms and the general population in the U.S. until the early 1980s. The airing of the CBS documentary, *If Japan Can ... Why Can't We?* in 1980 may have been the beginning of this discovery. Now quality consultants have become some of the "most sought-after advisors to American business, commanding fees of up to \$10,000 a day and filling their schedules a year in advance." (Main 1986, 30)

b. Government/DoD

Just as the world economy is forcing large corporations to change the way they view quality, competition among national programs for limited budget dollars has caused the Federal Government to examine the potential benefits of adopting TQM. In 1986, President Ronald Reagan signed Executive Order 12552 requiring increased productivity within all agencies of the executive branch. Tasked with implementing this order, the Office of Management and Budget (OMB) called for the implementation of TQM Government-wide as the best means of achieving the President's goal. (Burnstein 1988, 123)

Likewise, the shrinking defense budget and increasing costs of military programs have forced DoD to adopt TQM within the Department and throughout the Defense industry. To quote a recent Navy Times article discussing the anticipated budget for next fiscal year: "After factoring for inflation, the \$305.5 billion budget would make 1990 the fourth straight year of a real decline in military spending." This article stressed that 1990's funding shortfall had to be partially absorbed by manpower accounts, thus causing promotion and accession delays, tour extensions and early outs. The article also implies that readiness was immediately affected by the cuts, claiming "ships rated fully ready to get underway dropped more than 14% because of inadequate crew size." (Burlage 1989) The only way to maintain readiness with a smaller budget is to be more productive. TQM promises to provide this increased efficiency.

It should be noted here that many leaders within the Government familiar with the TQM philosophy did not wait until they received OMB direction to start their quality movements. Several agencies and agency components had begun the implementation of TQM years before it was required of them. The Internal Revenue Service, Equal Employment Opportunity Commission and Defense Logistics Agency, are just a few of the larger organizations in this category. (Burstein 1988, 123-125)

DoD considers TQM to be an "umbrella" concept and not a program (Strickland 1989, 18). This is because ongoing improvement programs neatly align under the continuous process improvement goals of TQM. Programs such as acquisition streamlining, transition from development to production, could cost, concurrent engineering, production management, and value engineering become improvement projects systematically addressed under TQM.

G. THE COST OF QUALITY

Quality experts believe that improving quality can dramatically increase productivity. However, in order to prove this, these experts need to quantify the benefits attributable to quality. In the past this has proven to be a difficult task. Phil Crosby has conducted significant research on this topic. Crosby defines the cost of quality:

The cost of quality ... is the expense of doing things wrong. It is the scrap, rework, service after service, warranty, inspection, tests, and similar activities made necessary by nonconformance problems. (Crosby 1979, 12)

Some quality researchers and companies implementing TQM call this the "hidden plant." As explained by Armand V. Feigenbaum, in Manufacturing Engineering magazine in October 1988:

For many years, management believed that a choice had to be made between quality and cost - the so-called trade-off decision, ... There was a myth that good quality had to cost more than bad quality and made production more difficult. In many companies, this myth helped to perpetuate what we identify as a 'hidden plant,' sometimes amounting to 15% to 40% of total production capacity, ... This capacity exists because of bad work, rework of unsatisfactory parts, retest and reinspection of rejected units, or retrofitting of products that have been recalled ... Quality-leveraged firms owe much of their cost advantage to the strong quality programs that have converted their hidden plant to productive use and acquired additional output at no additional cost. (Mishne 1988, 51)

Even defects are not free because it not only took labor hours, material and burden to produce them, but it will cost even more to have them inspected and reworked. The time used to rework could be used to produce more of the product. Therefore, if the defect was not produced in the first place, more could have been produced. Finally, to determine the cost of poor quality, you must also add to this the cost of lost sales due to the lesser quality of items produced. (Mishne 1988, 50-51)

How much over the cost of producing one unit does it cost to fix a defect? That usually depends on how long it goes undetected. A 1983 Institute for Defense Analysis study found that "it cost 2,000 times as much to repair a weapon in the field as to intercept the faulty part on the factory floor." (Morrison 1988, 31) It would be easy to guess that correcting the tire design defect up front would have cost Firestone much less than the \$182 million it eventually cost them to recall the Firestone 500 tire defectively produced in 1978 (Garvin 1988, 256).

A commonly heard phrase today is "quality doesn't cost; it pays!" Even a regulated utility such as Florida Power & Light has made U. S. News and World Report with its savings from better quality. Estimating "it cost ... \$2.48 million in the first six months of the year to notch up service reliability and productivity. At the same time, earlier improvements bolstered the bottom line by \$13.5 million." (Gabor 1988, 54)

H. SUMMARY

This chapter began with an examination of differing definitions of quality. For the Federal Government quality involves conforming to the contract requirements. The generally accepted definition of quality among Total Quality Management proponents is meeting the customer's need.

This chapter defined Total Quality Management as a management philosophy with the goal of continuous improvement. TQM emphasizes integrating the efforts of everyone in an organization.

This chapter also provided a historical perspective on the evolution of quality control in order to demonstrate that the current strategic quality management era is the natural result of the development or progression of quality control. It is

hoped that this historical prospective enhances the readers understanding of quality. The chapter ended with a discussion of the costs of quality.

IV. KEY ELEMENTS OF COMPETITION

A. PURPOSE

Chapter II provided a brief background into modern procurement competition. While the concept of having two or more independent suppliers compete for a requirement in the open market is relatively simple, implementation of procurement competition is far from simple due to the complex and multifaceted nature of the Federal Acquisition Regulation (FAR). In order to facilitate the analysis of procurement competition, this chapter identifies key "elements" of competition. Each of these elements describes one aspect of procurement competition and may be viewed as a single building block. If all these elements are assembled together, the total structure would be our current understanding of procurement competition. The purpose of this chapter is to identify and discuss these key "elements" of competition.

In describing these elements, this researcher recalls the following observation of procurement policy written by William Gates:

Procurement policy involves several elements. At one extreme are the detailed procurement regulations embodied in the Federal Acquisition Regulations (FAR), ... At the other extreme are global policy issues, such as military strategy and perceived threat, that indirectly influence the procurement environment. (Gates 1989, 1)

With respect to competition, procurement policy is indeed primarily set forth in detail in FAR guidance. Ten of the twelve elements of competition described in this Chapter are explicitly set out as regulatory requirements. However, this researcher also found that larger policy issues do come into play when defining elements of competition. The last two elements are examples of these "global policy issues."

B. THE TWELVE KEY ELEMENTS OF COMPETITION

1. Defining Full and Open Competition in Federal Acquisition

On one hand, Federal statute and regulation broadly define and explicitly encourage procurement competition in Federal acquisition. Specifically, Federal statutes (10 U.S.C. 2304 and 41 U.S.C. 253) require "that contracting officers ... shall promote and provide for full and open competition in soliciting offers and awarding Government contracts" (FAR 6.101).

On the other hand, Federal statute and regulation also set forth the exceptions to full and open competition. These exceptions have put significant boundaries around the pursuit of what an economist would call free market competition. For example, the FAR promotes socioeconomic programs in lieu of full and open competition by setting aside contracts for small business. The FAR also requires agencies and contractors to use specific suppliers for materials or services via regulations and clauses implementing various seemingly contradictory laws. (Buy American Act, Required Sources for Jewel Bearings, etc.).

The Federal Acquisition Regulation (FAR), Part 6, defines and prescribes policies and procedures to promote the "full and open" competition standard in the acquisition process. The FAR definition for full and open competition simply states that all responsible offerors be allowed to compete for Government required supplies and services. FAR Part 6 also defines and prescribes policies and procedures for "full and open competition after exclusion of sources" and "other than full and open competition."

Procedures spelled out under the title "full and open competition after exclusion of sources," allow the agencies to exclude a source or sources in order to establish or maintain an alternative source or sources. This may be done when

the agency head decides that exclusion of a source or sources is necessary: (1) to encourage competition on future requirements; (2) to expand the industrial base; or (3) to establish or maintain essential engineering, research, or development capability. Set-asides for small business and labor surplus area concerns fall under this category.

Each contract awarded without providing for full and open competition must reference the specific authority under which the contract is awarded. Authority exists for the following situations:

- a. Only One Responsible Source;
- b. Unusual and Compelling Urgency;
- c. Industrial Mobilization; or Engineering, Developmental, or Research Capability;
- d. International Agreement;
- e. Authorized or Required by Statute;
- f. National Security; or
- g. Public Interest.

A detailed discussion of these exceptions to full and open competition is beyond the scope of this thesis. However, a summary of these seven authorities is provided in Appendix A.

The FAR also requires that prior to commencing negotiation for a sole source contract or awarding any other contract without providing for full and open competition, the contracting officer must justify his action in writing, citing the specific authority, and receiving approval for that action. This document is called the Justification and Approval (J & A).

One of the often used examples of "other competitive procedures" is the use of multiple award schedules issued under the procedures established by the Administrator of General Services. The multiple award schedule program of the

General Services Administration is considered to be a competitive procedure if ordering offices follow the FAR procedures in placing orders under this program.

Full and open competition is often called the "competition standard." This is because the definition of full and open competition, together with how exceptions to the standard are defined, determine the extent to which the Government uses competitive procedures in agency acquisitions.

2. Publicizing Contract Actions

The purpose of advertising proposed contract actions is to allow all interested parties an opportunity to request the solicitation and to compete for the award of any given contract. Generally, this increases the number of competitors for a requirement while adding to the lead time required for the award of the contract.

Specifically, the FAR policy reads:

Contracting Officers shall publicize contract actions in order to - (a) Increase competition; (b) Broaden industry participation in meeting Government requirements; and (c) Assist small business concerns, small disadvantaged business concerns, and labor surplus area concerns in obtaining contracts and subcontracts. (FAR 5.002)

Other advertising requirements include posting the solicitation at the contracting office and maintaining a reasonable number of copies of the solicitation and all specifications for those interested in the procurement. The most difficult aspect of these advertising requirements, in the eyes of contracting personnel, is probably the waiting period requirements of the FAR. For example, after submission of an advertisement to the Commerce Business Daily (CBD), a submitting activity must wait 15 days until after the announcement has appeared in the CBD before they can release the solicitation. It can be assumed that the announcement appeared in the CBD 10 days after submission (or 6 days

after electronic transmission to the Commerce Department). After the solicitation has been released to the public, that solicitation cannot close for another 30 days. Therefore, unless an exception applies, a requirement over \$25,000 cannot be awarded in less than 51 days, even if all other planning steps are performed without a single day's delay.

3. Acquisition Planning

Acquisition planning is described in simple terms by Sherman:

The planning phase is principally where procurement strategy is developed. Critical to the strategy decisions is the translation of perceived needs into detailed statements that will be incorporated into one or more individual procurement actions. During the planning process, each procurement action is defined so that it fits the capabilities offered in the market place. (Sherman 1985, 219)

The FAR policy statement at 7.101 stresses two major themes concerning acquisition planning. The first aspect deals with performing the planning function:

Agencies shall perform acquisition planning and conduct market surveys for all acquisitions in order to promote and provide for full and open competition ... , or when full and open competition is not required ..., to obtain competition to the maximum extent practicable, with due regard to the nature of the supplies and services to be acquired. [emphasis added] (FAR 7.101)

The second aspect deals with coordinating the planning effort:

This planning shall integrate the efforts of all personnel responsible for significant aspects of the acquisition. The purpose of this planning is to ensure that the Government meets its needs in the most effective, economical, and timely manner. [emphasis added] (FAR 7.101)

Two additional important FAR considerations concerning acquisition planning are required of Agency Heads. They are set forth at FAR 7.103:

(a) Ensure that in no case is a contract to be entered into without full and open competition on the basis of a lack of acquisition planning or

concerns related to the amount of funds available to the agency for acquisitions (10 U. S. C. 2304(f)(5) and 41 U. S. C. 253f(5) (A).

(b) Ensure acquisition planners address the requirement by specifying their needs, developing their specifications, and to solicit their offers in such a manner as to promote and provide for full and open competition with due regard to the nature of the supplies and services provided. [emphasis added]

Acquisition plans are normally required only for the larger agency procurements. Acquisition planning is a key element of competition because in these larger procurements, competition may not be possible if it is not planned for early in the acquisition process. This is because it normally takes a great deal more time and effort to prepare a competitive specification than it does to prepare for a sole source specification.

4. Examining Contractor Qualifications

The Government reserves the right to award contracts only to contractors who are able to demonstrate that they are both responsible and fully capable of performing the most unique contract requirements. For these reasons the FAR sets forth the conditions for making a responsibility determination and the ground rules surrounding the establishment of any special qualification requirements.

a. The Responsibility Determination

Paraphrasing the FAR policy at FAR 9.103:

(1) Purchases will be made from responsible contractors only.

(2) The contracting officer must make an affirmative determination of responsibility. Without information clearly indicating that the contractor is responsible a determination of nonresponsibility will be made.

(3) An award based on lowest evaluated price alone may be false economy. While it is important that Government purchases be made at the lowest price, this does not require award to the supplier submitting the lowest offer. The contractor must affirmatively demonstrate its responsibility, including, when necessary, the responsibility of proposed subcontractors.

FAR 9.104-1 specifically states what is required of a prospective contractor in order to be determined responsible:

(a) Have adequate financial resources to perform the contract, or the ability to obtain them; (b) Be able to comply with the required or proposed delivery schedule; (c) Have a satisfactory performance record; (d) Have a satisfactory record of integrity and business ethics; (e) Have the necessary organization, experience, accounting and operational controls, and technical skills, or the ability to obtain them (including ... quality assurance measures applicable to materials to be produced or services to be performed by the prospective contractor or subcontractor); (f) Have the necessary equipment and facilities, or the ability to obtain them; and (g) Be otherwise qualified and eligible to receive an award under applicable laws and regulations.

Further discussion at FAR 9.104-3, of what constitutes a "satisfactory performance record," provides the following additional guidance:

A prospective contractor that is or recently has been seriously deficient in contract performance shall be presumed to be nonresponsible, unless the contracting officer determines that the circumstances were properly beyond the contractor's control or that the contractor has taken appropriate corrective action. Past failure to apply sufficient tenacity and perseverance to perform acceptably is strong evidence of nonresponsibility.

In addition, FAR 9.104-2 allows for the creation of special standards of responsibility when it is necessary for a particular acquisition or class of acquisitions. The FAR states that these "standards may be particularly desirable when experience has demonstrated that unusual expertise or specialized facilities are needed for adequate contract performance."

b. Qualification Requirements

A "qualification requirement" is a Government requirement for testing or other quality assurance demonstration that must be completed before award of a contract. Bidders or manufacturers who have had their products examined, and tested, and who have satisfied all other qualification requirements, are set forth in a Qualified Bidders List (QBL) or a Qualified Manufacturers List (QML), respectively. Products which have been examined and tested, and meet all other qualification requirements are listed in a Qualified Products List (QPL). There are, however, extreme administrative burdens in using QBL/QML/QPL procedures. They are so numerous and drawn out, that they are used more to standardize product requirements and publish them, as in the case of General Service Administration Federal Supply Schedules, than to ensure cutting edge quality standards are utilized.

5. Writing Specifications, Standards, Other Purchase Descriptions

The importance of specifications, standards, and other purchase descriptions is pretty obvious. Effective contracts cannot be written without a good definition of the requirement in terms that both parties understand.

The Government defines "Purchase Description" as a description of the essential physical characteristics and functions required to meet the Government's minimum needs.

FAR 10.001 defines "specification" and "standard," respectfully, as:

"Specification" means a description of the technical requirements for a material, product, or service that includes the criteria for determining if the requirements are met. Specifications shall state only the Government's actual minimum needs and be designed to promote full and open competition, with due regard to the nature of the supplies and services to be required. [emphasis added]

"Standard" means a document that establishes engineering and technical limitations and applications of items, materials, processes, methods, designs, and engineering practices. It includes any related criteria deemed essential to achieve the highest practical degree of uniformity in materials and products, or interchangeability of parts used in those products.

The Federal policy with regards to specifications, standards, and other purchase descriptions is provided at FAR 10.002.

(a)(1) Agencies shall specify needs in a manner designed to promote full and open competition (see Part 6) for acquisitions. (2) Agencies shall develop specifications and purchase descriptions using market research in a manner designed to promote full and open competition, with due regard to the nature of the supplies or services to be acquired. (3) In solicitations, agencies include specifications and purchase descriptions that - (i) permit full and open competition; and (ii) include restrictive provisions or conditions only to the extent necessary to satisfy the minimum needs of the agency or as authorized by law. (4) Agencies shall prepare specifications and purchase descriptions which reflect the minimum needs of the agency and the market available to satisfy such needs. Specifications and purchase descriptions may be stated in terms of (i) function... (ii) performance... (and) (iii) design. [emphasis added]

The user's satisfaction with the product is addressed at FAR 10.009 :

(a) Agencies shall encourage users to communicate with acquisition organizations on- (1) the adequacy of the specifications to communicate the user's minimum needs; (2) product capability; (3) product failures and deficiencies; (4) suggestions for corrective action; (b) Whenever practicable, the agency may provide affected industry an opportunity to comment on the critiques. (c) Acquisition organizations shall consider user critiques and take appropriate action on bona fide complaints and suggestions.

FAR 10.006 reminds us that: "Unless otherwise excepted by law, specifications and standards in the Index of Federal Specifications & Standards are mandatory." Exceptions exist for: unusual and compelling urgency; small purchases; overseas procurement; items of authorized resale; and construction of physical facilities where other nationally recognized construction standards apply.

6. Evaluating Offers

The evaluation of offers is a significant event in the process leading to a competitive award. The extent to which the Government is able to address price-related or quality-related factors when evaluating offers depends in large part on the solicitation method used. The FAR sets forth two solicitation methods, either "sealed bids" or "negotiated contracts." It is much harder to evaluate quality when using the sealed bid solicitation method than when using the negotiated contract solicitation method.

a. Sealed Bids

One of the required conditions for using Sealed Bids is that the award (to a responsive and responsible bidder) will be based only upon price and the price related factors, included in the invitation. (FAR 14.103-2(d)) This obviously restricts your ability to address quality.

b. Negotiated Contracts

The FAR is written with the intent of using both price and quality as two of the primary considerations in awarding negotiated contracts. FAR 15.605 provides the FAR guidance concerning negotiated contracts:

(a) ... [Evaluation] factors ... should be tailored to each acquisition ...;

(b) ... However, price or cost to the Government shall be included as an evaluation factor in every source selection. Quality also shall be addressed in every source selection. In evaluation factors, quality may be expressed in terms of technical excellence, management capability, personnel qualifications, prior experience, past performance, and schedule compliance ... [emphasis added]

(c) While the lowest price or lowest total cost to the Government is properly the deciding factor in many source selections, in certain acquisitions the Government may select the source whose proposal offers the greatest value to the Government in terms of performance and other factors ... [emphasis added]

7. Procuring Major Systems

Competition for major systems is significant and different due to the sheer financial magnitude and enormous technical complexity of these programs. Department of Defense Directive 5000.1 states that "effective design and price competition" is one of the most important principles and objectives of a major system acquisition. Furthermore, DoD Instruction 5000.2 requires that the program manager specifically give his plan for competition in all phases of the acquisition life cycle in the System Concept Paper at Milestone I, as well as in the Decision Coordinating Paper and the Integrated Program Summary at future milestones.

With only a few exceptions, new major systems will be competed through all phases of the acquisition process. Competition in the design phase is discussed in the following quotation:

During the design phase, competition is usually intense. However, it should be noted that, although the estimated life-cycle cost of a particular system is a factor in the ultimate design selection, the selection is usually more heavily weighted towards the technical effectiveness of the competing designs, or the management and capacity considerations of the competing contractors, than it is to the estimated production and support cost of the proposed system.... Design competition may, therefore, exert little, if any, influence on lowering the life-cycle cost of the competing systems. (Sellers 1983, 12)

The second major phase of the acquisition process, the production phase, begins when the selection of the winning design is made. It is during the production phase that competition may lead to lower prices. "Until recently, however, there has been a lack of competition in this phase of the acquisition process." (Sellers 1983, 12) Obviously this is where competition will save the most money because production and support costs are a more significant factor in the selection of the prospective contractor.

Dual and second sourcing of major systems are the most often used cases to demonstrate the potential benefits of competition. Dual sourcing implies an active effort on the part of DoD to start and maintain competition throughout the system's life. Second sourcing implies creation of an alternative source for production, typically after the prime contractor has produced a number of units or several lots. (Kankey 1987, 15)

While dual and second sourcing of major weapons systems do demonstrate the potential benefits of competition, such as cost savings, increased quality and expansion of the industrial base, they also demonstrate the potential costs of competition, such as the additional front end costs of facilities and tooling, technical data and technical transfer costs. Other problems include the unwillingness of contractors to participate in attempts to second source, the complexity of managing changes to the technical data package, dilution of learning curve improvement, and reduced economies of scale. (Sellers 1983, 12-13)

8. Promoting Subcontract Competition

Competition at the subcontract level is important to the Government because a significant portion of the costs reimbursed under large agency contracts relate to contract requirements passed from the prime contractor to subcontractors. However, despite its importance, compared to the finely worded competition requirements throughout the FAR concerning the selection of prime contractors, competition at the subcontractor level is much less regulated. For example, FAR Part 44, which addresses the subject, deals exclusively with two issues: 1) consent to subcontract; and 2) the contractor's purchasing system review (CPSR).

The following paragraph paraphrases the FAR policy set out in Part 44 concerning consent. The Government requires the prime contractor to obtain

written consent from the contracting officer in order to enter into a particular subcontract when the subcontract work is complex, the dollar value is substantial, or the Government's interest is not adequately protected by competition and the type of prime contract or subcontract. However, the consent requirements may be waived, in certain circumstances depending on contract type and other factors, when the contractor's purchasing system has been reviewed and approved.

The clause Competition in Subcontracting (APR 1984) states: "The Contractor shall select subcontractors (including suppliers) on a competitive basis to the maximum practical extent consistent with the objectives and requirements of the contract." (FAR 52.244-5)

"Generally," as stated at FAR 9.104-4(a) "prospective prime contractors are responsible for determining the responsibility of their prospective subcontractors." Although, when it is in the Government's best interest, the Contracting Officer may directly determine a prospective subcontractor's responsibility.

The purpose of a CPSR is to " ... evaluate the efficiency and effectiveness with which the contractor spends Government funds and complies with Government regulations when subcontracting." (FAR 44.301) While the CPSR primarily looks at the degree of competition received and does have a significant impact on companies reviewed, only contractors with more than \$10 million in anticipated Government prime contracts and subcontracts for the upcoming twelve months are reviewed. Reviews are conducted every three years, for companies that continue to conduct business above the \$10 million threshold.

9. Observing Protest Procedures

Protest procedures are a key element of competition because the protest has the ability to delay the award of contracts, making the Government less

efficient and costly. FAR Part 33 addresses protest procedures. A protest is defined at FAR 33.101 as:

... a written objection by an interested party to a solicitation by an agency for offers for a proposed contract for the acquisition of supplies or services or a written objection by an interested party to a proposed award or the award of such a contract.

It is FAR policy that the contracting officer consider all protests submitted, whether filed before or after award. An "interested party" may submit a protest directly to the agency, the General Accounting Office (GAO) or to the General Services Board of Contract Appeals (GSBCA) for Automated Data Processing Equipment. The FAR meaning of "interested party" is rather liberal, an "actual or prospective offeror whose direct economic interest could be affected by the award of the contract or by failure to award the contract." The following discusses the procedures for protests filed directly to the agency and to GAO only. This discussion will suffice for analyzing the protest procedure element of competition for this thesis because protests filed to the agency provide the least impact and protests filed with GAO provide the most impact on the competitive procurement process.

a. Protests to the Agency

When an agency receives a protest, the contracting officer cannot make an award until the matter is resolved unless he first determines that one of the following conditions, set forth at FAR 33.103, applies:

... (1) The supplies or services to be contracted are urgently required.
(2) Delivery or performance will be unduly delayed by failure to make award promptly. (3) A prompt award will be otherwise advantageous to the Government.

For protests received after award at the agency, the contracting officer is not required to suspend performance or terminate the contract.

b. Protests to GAO

As indicated in FAR 33.104, protests to GAO are much more cumbersome and restrictive on the actions of the contracting officer. When a protest is filed with GAO, within a day the protestor is required to file a copy with the contracting officer. The protestor is allowed to request applicable documents from the contracting agency. The agency is required to prepare a report to be submitted to GAO, normally within 25 days, providing copies all applicable documents along with the contracting officer's signed statement of findings, actions and recommendations. The agency will also provide notice of the protest to all concerned. If a protest is filed with GAO before award and the agency has received notice from GAO, then a contract may not be awarded unless authorized by the head of the contracting activity upon a written finding that urgent and compelling circumstances exist and the award is likely to occur within 30 days of the written finding. In addition, GAO must be notified prior to the award of the contract.

If a protest is filed with GAO after the contract is awarded and the agency has received notice from GAO within 10 calendar days of award, the contracting officer is required to immediately suspend performance or terminate the contract, unless the head of the contracting activity writes a finding that contract performance is in the best interests of the United States; or urgent and compelling circumstances apply. Again, performance is not authorized until GAO has been informed. If notification is after 10 days, the contracting officer need not suspend performance or terminate the contract.

10. Promoting Socioeconomic Programs

The extent to which the Government has to compete requirements, is affected by the standard of full and open competition and exceptions to the standard. Socioeconomic programs are a key element of competition because

they are unique exceptions to full and open competition. In socioeconomic programs certain established sources are excluded from competing for a requirement, in order that society's less advantaged businesses and individuals can also benefit from Government procurement programs. The following socioeconomic programs are covered in FAR Subpart D:

- a. Small Business and Small and Disadvantaged Business Concerns
- b. Women-owned Business Concerns
- c. Labor Surplus Area Concerns (FAR Part 20)
- d. Labor Laws (Davis-Bacon and Walsh-Healey Acts)
- e. Environmental Conservation and Occupational Safety
- f. Protection of Privacy and Freedom of Information
- g. Foreign Acquisition Programs (Such as: Buy American Act, Balance of Payments Program, Various International Agreements)

Although much could be written concerning the impact of each of these socioeconomic programs have on competition, to best serve the purpose of this thesis, only the small business and small and disadvantaged business concerns will be discussed in detail. The small business programs are most indicative of the effect a socioeconomic program may have on competition and quality programs. These programs are the most often encountered and addressed within Federal contracting activities.

Stated succinctly at FAR 19.201:

It is the policy of the Government to place a fair proportion of its acquisitions, including contracts and subcontracts for subsystems, assemblies, components, and related services for major systems, with small business concerns and small disadvantaged business concerns. (FAR 19.201)

The Small Business Act also requires each agency to establish an Office of Small and Disadvantaged Business Utilization. Heads of contracting activities

are responsible for effectively implementing programs by achieving numerical goals for participation.

One of the most significant procedural differences that exists between contracting with large and small business is encountered when making the responsibility determination. A procedure called the Certificate of Competency (COC) Program comes into play when dealing with a small business. The COC Program is set forth in FAR Part 19:

The COC Program empowers the Small Business Administration (SBA) to certify to Government contracting officers as to all elements of responsibility of any small business concern to receive and perform a specific Government contract. (FAR 19.602-(2))

In other words, if a contracting officer wishes to make a negative responsibility determination on a small business, the contracting officer does not have the authority to make that decision. The matter must be forwarded to the SBA and they will make the determination. If there is a conflict of opinion between a SBA Regional Office and the Agency, the Agency may request a review at the SBA Central Office. However, the SBA will make the final determination.

The two most effective means of achieving small business participation in Government acquisition are the use of set-asides and the promotion of subcontracting opportunities.

a. Small Business Set-asides

As stated in FAR 19.501:

The purpose of the small business set-asides is to award certain acquisitions exclusively to small business concerns. ... The contracting officer shall review [all] acquisitions to determine if they can be set-aside for small business...documenting why a set-aside is inappropriate when an acquisition is not set-aside.

All small purchase actions (less than \$25,000 in value) are automatically set-aside for small business.

b. Subcontracting to Small Business

A second avenue of pursuing small business participation is by encouraging prime contractors to use small business subcontractors. FAR 19.702 states:

Any contractor receiving a contract for more than the small purchase limitation in 13.000 shall agree in the contract that small business concerns and small disadvantaged business concerns shall have the maximum practical opportunity to participate in contract performance consistent with its efficient performance.

In prime contracts over \$500,000, with few exceptions, small business and small disadvantaged business goals are negotiated into written subcontracting plans. Any contractor who fails in good faith to meet subcontract plans may be determined to be "in material breach of its contract." (FAR 19.702(c))

11. Strengthening the Industrial Base

One of the larger global issues that is only indirectly addressed in the FAR is the need to maintain a strong industrial base. Statutory authority exists for awarding contracts using other than full and open competition for the purpose of maintaining industrial mobilization or engineering, developmental, or research capability (FAR 6.302-3). However, the FAR does not set forth a clear Federal policy concerning this issue. For example, the policy does not elaborate on the use of the statutory authority provided, nor does it attempt to identify critical technologies.

The Buy American Act of 1954 is an example of how the FAR addresses industrial base improvement considerations. The policy set forth in the Act, is reiterated at FAR 25.102:

The Buy American Act requires that only domestic end products be acquired for public use, with certain exceptions ... such as articles, materials and supplies that are not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

However, the Buy American Act stands alone as a single initiative affecting the industrial base, not as a single component of an established industrial policy.

The defense industrial base generally consists of the same manufacturers who supply goods to the general public. DoD's procurement competition policy has a significant impact on the U. S. industrial base because DoD is a major purchaser of manufactured goods.

Ninety-five percent of the manufactured goods purchased by the Department of Defense come from a broad spectrum of 215 industries. In 1985 the Department spent almost \$165 billion within these industries. This represented 4.1 percent of America's total gross national product and 21 percent of the manufacturing gross national product. (Costello 1988, v)

Dr. Costello, as Undersecretary of Defense (Acquisition) wrote extensively on this subject in "Bolstering Defense Industrial Competitiveness" released in July 1988. He stressed that the future security of our nation rests on retaining both technological and manufacturing superiority needed to support the national defense. (Costello 1988, 1)

He also contends that U. S. industrial policy is in fact made up of a host of policies, laws and regulations and that analysts of American competitiveness agree "that this *de facto industrial policy* is, at best, incoherent and, at worst, counterproductive." (Costello 1988, 10)

12. Maintaining the Public Trust

Maintaining public trust in the competitive procurement system is another global issue having considerable impact on the Federal procurement

environment. Public institutions by definition exist for the common good of the public and operate on public funds (i.e. taxpayer contributions). Failure to spend funds in an effective and efficient manner leads to additional restrictions on the expenditure of these funds, or the withholding of funds. These funds, of course, are the lifeblood of agencies, departments and programs. As discussed by then Deputy Secretary of Defense Carlucci:

Competition ... [w]hen applied to procurement ... assures fairness, avoids favoritism, obtains lower prices, and achieves better performance. Failure to obtain competition for Government contracts results not only in a loss of these benefits but in a loss of confidence in the integrity and quality of the acquisition process. Such losses have a very serious effect on the ability of the DOD to accomplish its basic mission. (Carlucci 1981)

Competition is an important ingredient to the public perception of the integrity of the acquisition system. Although the FAR addresses specific ethical standards, it would not benefit the reader to list them here. However, it is important to keep in mind the extreme importance of the objective of maintaining the integrity throughout every aspect of the procurement process.

C. SUMMARY

The primary purpose of this chapter was to identify and define key elements of competition. Ten elements of competition have their basis in legislation and guidance on these elements are contained in the FAR. However, two larger policy issues, strengthening the industrial base and maintaining the public trust, also play a key role in our understanding of competition in Government acquisition. These two elements are not so clearly spelled out in Federal regulation. These twelve elements of competition will be analyzed to determine the compatibility of competition with the principles of TQM, which will be identified in the next chapter.

V. PRINCIPLES OF TQM

A. PURPOSE

Chapter III provided an introduction and background into TQM. The purpose of this chapter is to identify the principles of TQM. Principles in this context mean fundamental management concepts which form the foundation for the TQM philosophy. These TQM principles will be analyzed in Chapter VI to determine the extent of their compatibility with the previously identified elements of competition.

B. THE FOURTEEN PRINCIPLES OF TQM

Unlike the elements of competition, the principles of TQM have been listed numerous times by TQM experts, such as Deming, Juran, Freigenbaum and Stuelpnagel, among others. It is not difficult to find general agreement among most TQM experts on the principles listed in this chapter.

The following are the author's listing of the principles of TQM. As you read this list, notice how many of the principles are interrelated and how adopting a given principle may make it easier to adopt one or more of the other principles. Conversely, notice how the failure to implement the cultural change necessary to adopt a given principle may hinder the adoption of one or more other principles. This point will be expanded on later in this thesis.

1. Transformative Leadership

Deming states that top management must "create constancy of purpose" and "learn the new philosophy." (Deming 1981-82, 17) Other TQM writers also call for more leadership from top management. They ask for a new type of manager, one who: a) has a vision; b) understands the necessity of change and

how to manage change; c) imparts his vision by empowering subordinates; and d) commits himself and his organization for the long-term. These four components, of what Bennis and Nanus call "transformative leadership" in their book Leaders, are described in greater detail below:

a. Vision

As described by Bennis and Nanus: "leadership is necessary to help organizations develop a new vision of what they can be... " (Bennis and Nanus 1985, 3). The TQM process implants one central, long-term, vision or goal: quality. The TQM process removes other potentially suboptimizing goals, usually short-term goals such as the next quarterly dividend.

b. Transformation

Transformative leadership is critical when first adopting TQM because cultural change is required, and cultural change is difficult, especially in large organizations, such as a large business or the Government. However, transformative leadership is also just as important after the concept of TQM has taken hold. This is because the pursuit of quality is a continuous process of improvement and change.

c. Leadership

The leader's vision of continuous improvement may be expressed in writing. However, this is not required if the vision can otherwise be adequately communicated throughout the organization and commitment developed to move towards the state envisioned. (Bennis and Nanus 1985, 33-34, 143)

It is not enough to just have top management seeking to improve all processes. This vision must be imparted on subordinates, and these subordinates must be empowered to pursue process improvements themselves. Again citing Bennis & Nanus, the new leader: " ... is one who commits people to action, who

converts followers into leaders, and who may convert leaders into agents of change." (Bennis and Nanus 1985, 3)

The most often heard statement, from those implementing TQM, is something similar to the following: "(t)he process has to start at the very top and filter down because without solid evidence of support from the executive suite, workers quickly tag the program as yet another management sham." (Mishne 1988, 52) To rephrase this statement: "TQM cannot be mandated, it must be promoted." (Stuelpnagel 1988, 58)

d. Long-term Commitment

While vision is important, what may be more important when adopting TQM is the tenacity with which the leadership of the organization "stays the course" (Bennis and Nanus 1985, 43). Take Ford Motor Company as an example, where "Quality Is Job 1." The vision is clear, but adopting TQM is where the hard work begins. In 1988, Ford had been implementing TQM for five years and reportedly was only 15% complete. (Stuelpnagel 1988, 58) To borrow a Hyman Rickover quote from Bennis and Nanus: "Good ideas are not adopted automatically. They must be driven into practice with courageous patience." (Bennis and Nanus 1985, 43)

In pursuit of quality, staying the course includes allocating resources for research, education and training, and providing the necessary capital equipment and maintenance to pursue quality today and in the future (Deming 1981-2, 17).

In summary, leadership may be described as the steadfast commitment and action on the part of a leader in pursuit of a vision that encourages followers to pursue that same vision (Bennis and Nanus 1985, 3). Leadership, in the context of TQM, may be described as the vision of continuous process

improvement that starts at the top of an organization and is promoted down to each and every employee.

2. Customer Orientation

In contrast to the predominant Government interpretation that quality is meeting the contract specification, in TQM, quality is giving the customer what he wants or needs. As stated by then Secretary of Defense Carlucci, when announcing the start of the DoD program: "The ultimate goal is the satisfied, quality-equipped, quality-supported soldier, sailor, airman, and Marine." (Carlucci 1988)

How are customer needs analyzed? The following explanation is provided by Stuelpnagel:

... this requires that the customer be integrated into the company organization. Customer need is analyzed by a technique developed by the Japanese called Quality Function Deployment (QFD). This technique converts customer requirements into specific design and production requirements. Its objective is to specify the best product to fit the need... (Stuelpnagel 1988, 59)

Deming believes that the needs of the customer must not only be analyzed, but must also be anticipated. Deming illustrates this point with a discussion of the development of the pneumatic tire by Harvey Firestone. " ... if you'd asked customers in 1900 what they needed in a tire, nobody would have suggested the pneumatic tire, it was somebody's dream...." (Walton 1988, 30).

The Quality Function Deployment system, besides being a set of checking practices designed to insure that the customer's voice is heard throughout the design and production process, also "promotes the interdepartmental cooperation that 'matrix' management promised but failed to deliver in the West." (Cole 1987, 50)

3. Continuous Improvement

Continuous improvement is explained quite thoroughly by Mansir and Schacht:

The essence of continuous improvement is nicely captured in the Japanese concept of Kaizen, which means "continuous improvement by doing little things better, and setting and achieving ever-higher standards." The strength of continuous improvement lies in the cumulative effect of its many small changes, which can occur so frequently but in such small increments that the steps are not really visible. It has been said of Michelangelo's Sistine Chapel that, "The approach to perfection is through millions of trivial strokes, yet to approach perfection is by no means trivial." This is the essence of continuous improvement. (Mansir and Schacht 1989, 3-13)

Under the TQM philosophy, all processes are subject to the principle of continuing improvement. Even after "acceptable" results have been achieved, you start looking for a problem that is keeping you from improving further.

A striking example of this concept lies in the innovative works of Japanese industrial engineer Shigeo Shingo. Toyota had previously contracted Shingo to reduce the setup time for a 1,000 ton press from four hours to one hour and a half. Shingo accomplished this feat despite the fact that the one hour and a half setup time was unheard of in the automobile industry at the time. Yet Toyota was not satisfied. Due to their belief in continuous improvement they again contracted with Shingo in 1969 to further reduce the setup time to three minutes. Shingo surprisingly did not refuse the contract because he too believed in continuous improvement. Shingo was successful and today writes about his achievements under the acronym SMED - Single Minute Exchange of Die. In the book of that title, he talks about the next step, OTED - One-Touch Exchange of Die, defined by Shingo as making setup changes in less than one minute. (Shingo 1985, xxii)

Not surprisingly, Toyota has won more Quality Awards than any other Japanese company and is also considered the most cost efficient car manufacturer in the world. (Impoco 1988, 56)

4. Robust Design

A "robust design" is a concept generally attributed to the Japanese engineer and management consultant Genichi Taguchi. The goal is to create a design that is:

... strong and healthy and capable of properly performing its functions under a wide range of conditions, including consumer misuse. Robust designs are less sensitive to variations in parts, processes, and operating environments. (Mancir and Schacht 1989, 4-86)

Main cites an example that helps to clarify this principle:

The primitive quality control still practiced by most U.S. industries depend on inspectors to discard or return work that does not meet specifications, typically up to 30% of a factory's output. In a ceramics factory, for instance, inspectors throw out warped tiles. By comparison the statistical process control advocated by Deming and others throws out the inspectors and gets hold of the variables in the process - changes in temperatures of the kiln, say, or time in the kiln - to reduce the warping. But Taguchi goes a step further with a "robust" process that produces good tiles even with erratic ovens. He has found, for instance that adding lime to the clay creates a basic material less likely to warp when the kiln temperature is out of whack. (Main 1986, 34)

The Taguchi Methods also stress the importance of interdepartmental involvement (i.e. between marketing, production, customer service, material management, etc.) at the front end of new product or process design.

5. Variability Reduction

Process variability is simply a fact of life and is due to numerous causes. Some of these causes are controllable, others are not. Deming identifies two causes for variation: common causes and special causes. The common causes are natural, unpreventable and statistically predictable. The special causes are not

natural, are preventable and are identified apart from common causes because of their unpredictability on process control charts. For example, let us say we are measuring the accuracy of wood cutting. The hardness of the wood may cause a variation in the quality of the cut. This would be a common cause. However, if the blade on the saw was not properly aligned and this improper alignment went undetected, this would be a special cause of variability.

The theory and techniques developed by Shewhart to minimize variability, now termed statistical process control (SPC), are the central concepts behind TQM.

Variability is a primary source of defects and waste. It exists everywhere in every process and product, and it can never be totally eliminated. However, the amount of variability in processes and products can be controlled and reduced by applying several simple and straightforward statistical techniques and tools. (Mancir and Schacht 1989, 4-71)

Taguchi, along with his other contributions, had developed a statistical method of estimating losses for designs that do not control variability, called the quality loss function. This concept is used to optimize designs by minimizing this loss. Taguchi's theory is that any variation from the ideal measure, even if this measurement is within the high and low limits of the specification, will result in less customer satisfaction.

6. Statistical Thinking

Looking at this principle from a different perspective, this principle may be called "communicating with data." Each individual within the organization is taught to gather data in order to support their problem solving. When a problem solving session is conducted, opinions are of little value if not supported by data. TQM's statistical terminology and tools become a common language for those in

upper management and those on the production floor, from the president, to the accountants, to the factory worker.

A writer cites an example of this principle when she observed Japanese quality consultants grilling an employee about his job at Florida Power and Light. She explained the purpose of the grilling was to train the employee "to back up his answers with statistical data, not gut reaction." The consultant's goal was to teach employees to search for problems, "find faulty logic and recommend alternatives," then to use statistical data as evidence to support their position. (Gabor 1988, 54)

7. Management Responsibility

Under TQM, quality is accepted as everyone's job, but management is primarily held responsible instead of the worker when there are quality problems. This is a major cultural change in U. S. organizations. As explained by Myron Tribus in Quality First: "Workers work IN a system. Managers work ON a system - with the workers' help." (Tribus 1987, x)

The quality experts agree that only a small percentage (usually 15-30%) of the causes for defects are within the control of the worker on the line, therefore, he is rarely responsible for the defects produced. Conversely, management has control over the vast majority (the remaining 70-85%) of the causes. In other words, the design of the process is responsible for the defects and management is responsible for the design of the process. TQM experts argue that it is pointless, if not hypocritical, to exhort a worker on the line to turn out a perfect product when the overwhelming majority of imperfections are due to the design of the process. For example, Deming argues this point in his red bead demonstration. Deming also discourages the use of quantity-based production goals in performance appraisal systems for the same reason. (Walton 1985, 51)

8. Quality Control

TQM obviously is concerned with preventing defects, rather than detecting them after they have occurred. It should follow that the tasks of quality control personnel also change with this change in perspective.

[Quality control personnel] are no longer responsible for inspecting the product, that is done by the worker. Quality control, instead, verifies that the quality process, such as SPC, is being followed and improved both in-house and at the supplier's plant. When statistical evidence exists that the product is being made with a capable process, inspection is waived, thus simplifying production. (Stuelpnagel 1988, 59)

It is now the quality control department's responsibility to train workers and to be on the floor assisting the workers with problem solving. The Japanese call this concept of keeping quality assurance teams roving factory floors "genbashugi," or the principle of being on the spot. (Impoco 1988, 56)

9. Education and Worker Training

Dramatically more education and worker training is required with TQM. It has already been shown that every employee must understand the concept of continuous process improvement, as well as how to gather data and conduct problem solving. Dore, in explaining the success of the Japanese economy, considers the fact that the Japanese are well educated to be one of the eleven "main distinctive characteristics of the Japanese economy" (Dore 1987, 12).

One of the problems with the present U.S. production management system is that problem solving training has been given to managers. Unfortunately the problem solving skills are needed by the person working on the line with the process. A second problem is that the longer organizations fail to implement TQM training at the worker entry level, especially for middle

managers, the longer the delay for full support of TQM process improvement. (Stuelpnagel 1988-89, 5)

All employees must be trained in the use of the analytic tools used in TQM. These tools include: Pareto analysis, cause-and-effect diagrams (also known as Taguchi's fishbone diagrams), process flow analysis, run charting, scatter plots, X-bar and R-bar charts and other general problem solving techniques. (Tribus 1984, 5)

It is important to note that the continuous improvement principle applies not only to an organization's processes, but also to each individual within the organization. To this end, education and training must be used to help individuals improve themselves, and improve their "interaction with superiors and subordinates and with formal organizational systems." (Mancir and Schacht 1989, 5-19)

10. Cultural Change

Quality experts agree that all U.S. citizens must be educated with respect to quality. This education will be difficult because it will require a significant cultural change. Within DoD the need for cultural change was realized early on. Jack C. Strickland, Director for Industrial Productivity and Quality, Office of the Assistant Secretary of Defense (Production and Logistics), states:

It has become evident in the face of increasing technological complexity, tough budgetary pressure and evident inefficiency, that critical DoD issues cannot be addressed with "business as usual" or organizational face lifts. Nor can they be addressed only as internal DoD matters or solely for solution by contractors and subcontractors. [TQM] was selected as a proven management philosophy that was powerful enough and universal enough in scope to achieve the cultural change required for DoD to meet the unprecedented levels of quality required for future weapons systems and equipment. (Strickland 1989, 18)

The extent and complexity of this cultural change is explained by Stuelpnagel and Mishne, respectively:

[this is the] real core of TQM... The company must believe in and stand by the humanistic principles of TQM so that the leadership, working conditions and job security support the individual's pursuit of quality. This change is the most difficult because it involves basic differences in the U.S. work culture and legal system versus the Japanese. (Stuelpnagel Nov. 1988, 60)

... managing for quality means nothing less than a sweeping overhaul in corporate culture, a radical shift in management philosophy, and a permanent commitment at all levels of the organization to continuous improvements. (Mishne 1988, 51)

Many cultural changes have already been mentioned in this thesis, for example:

- Viewing quality management as a competitive corporate weapon.
- Realizing the myth that quality does not cost, it pays.
- Understanding that the manager, not the worker, is responsible for the majority of defects.
- Emphasizing long-term goals over short-term goals.
- Organizations encouraging and accepting change versus resisting change.

Many more cultural changes will be addressed later in this thesis. It is not important here to list every situation where cultural change is required, in fact, it may be impossible to list them all. Furthermore, if they were all listed, then an argument would most likely ensue as to the need and extent of the cultural change necessary in the U. S. The important thing to understand here is that until TQM is fully implemented in the U. S., the full scope of the cultural change necessary will not be fully realized. However, the quality experts all predict the scope of the cultural change required will be massive.

In describing the many ways universities could support the TQM movement, Stuelpnagel stresses: " ... most important, new concepts and technology need to be explored to tailor TQM for our laws and work culture, and to improve it" (Stuelpnagel 1988/1989, 5). Fortunately, at least we are

beginning to realize that cultural change (in the form of adopting TQM) is necessary. As explained by Mishne:

Apparently this new philosophy quickly caught the attention of top-level executives, according to the results of the Gallup poll. Executives' recognition of a need to change corporate culture and secure CEO leadership and involvement in choosing ways to improve the quality of products and services. In 1986, 15% of the executives surveyed ranked corporate change a 10 (most important) on a 10 point scale. In 1987, that figure leaped to 45%. (Mishne 1988, 51)

11. Teamwork

In TQM a single goal of continuous improvement of all processes by all employees has been established. As explained by Mancir and Schacht:

Although knowledgeable, skilled employees are crucial to the improvement process, the individual skills they provide may be substantially leveraged when employed in the context of teamwork ... One universal goal is to ultimately involve every member of the organization in process-improvement-team activity. (Mancir and Schacht 1989, 3-19)

Common approaches will be used by teams to pursue process improvement. Furthermore, employees will communicate with statistical language, depersonalizing the cooperation in working towards the goal. Process Action Teams (PATs) are set up to cross organizational functions. The Japanese often use large open office spaces to put managers and workers in near proximity to encourage communication. All of these factors emphasize that teamwork is a basic feature of TQM. (Stuelpnagel 1988/1989, 4)

12. Supplier Integration

Suppliers are looked at differently under the TQM philosophy. In order to ensure the quality of incoming deliveries, the supplier base is reduced and suppliers are integrated into company operations to a much greater extent than before the adoption of TQM. Under TQM, companies are much more interested in their supplier's quality management philosophy and are more likely

to assist suppliers with their quality control procedures. Long-term, sole source commitments with suppliers are encouraged. Suppliers are also expected to provide input into the design of new products, as well as to provide smaller shipments of higher quality goods, that may be used "just in time."

Honeywell reduced the number of its suppliers by 2/3, increasing the acceptance of incoming material from 83% to 98% in 5 years. Honeywell explained that their "old-culture policy was to develop a Honeywell specification without bothering to find out the effect on the supplier." Then when the supplier did not manufacture or modify the part well, Honeywell would accept it and rework it themselves. Bringing the supplier into the design and planning process changed the old-culture policy and also got rid of the adversarial relationship between supplier and company that previously existed. (Walton 1988, 178)

Walton paraphrases Deming on his view of specifications in order to demonstrate the need for supplier integration:

Specifications don't tell you what you need. A supplier does not know from your specifications what you need. He has to find out how you are going to use this stuff..." This will mean continual movement toward one supplier, for any one item, so far as possible. (Walton 1988, 29)

Although the DoD has not adopted the principle of limiting the number of suppliers, they do see the need to export the TQM philosophy to their suppliers, as indicated in their brochure:

TQM relies on continuous improvement in DoD's acquired products and services as well as in its own internal processes. TQM practices address improving contractor capabilities through education and technical assistance, and more innovative approaches to contracting and acquisition that rely increasingly on contractor continuous improvement performance and capability. (DoD TQM Booklet 1988, 7)

13. Individual Participation (Assumed Responsibility)

We have already seen that TQM involves all employees. However, this principle goes farther than that. It includes an inherent pride and assumed responsibility for the job being done right.

TQM "goes back-to-basics by reinstating the individual as the key element and then focusing on the process managed by the individual." (Stuelpnagel 1988/1989, 4) This feature of TQM may be considered as the customer orientation principle applied inside the organization. Simply stated, the next person in the production line is the customer. All employees work as both a producer and a customer. Each attempts to deliver products or services of perfect quality and insists on the receipt of perfect products or services. Zero defects is the goal.

How different is this from present attitudes about work in the United States? The following is an excerpt from a Public Agenda Forum survey of the nonmanagerial work force cited by Bennis and Nanus:

- Fewer than 1 out of every 4 jobholders say that they are working at full potential
- One half said they do not put effort into their job over and above what is required to hold onto it. (Bennis and Nanus 1985, 7)

The person working on the process is expected to be, and usually is, the most knowledgeable person with respect to that process. However, because the worker knows the process does not mean he knows how to systematically improve that process. Deming states "It is possible ... to know everything about a business except how to improve it. This (knowledge of how to improve the process) is some other kind of knowledge" (Walton 1988, 95). This again

emphasizes the importance of training, and the interrelationship between these principles.

14. Congressional Interface

The final principle, termed "Congressional Interface," was added to address the political nature of establishing national policies affecting quality management in the U.S. This principle has not been subjected to Japanese field testing and refinement. As discussed in Appendix B, since World War II Japanese politicians have not played a role in the development of their national industrial policy and quality management movement. This can be attributed to unanimity of national effort to produce quality goods and services. (Dore 1987, 16)

Unfortunately, in the U. S. the interaction with our legislative officials will be critical and will probably further hinder the quality movement in this country. There is no national policy nor agreed upon long-range goals in the U.S. with respect to quality management. Yet trade, tax, antitrust, safety, defense industrial base and environmental issues, to mention just a few, usually become the causes espoused by politicians in the U. S. Like the recent Congressional battles over minimum wage and the savings and loan bail out, these issues are often resolved by compromise after political fights and thus result in further fragmented pieces of legislation rather than a unified national policy and strategy with respect to these issues.

The Congressional interface will be even more critical for DoD and Federal Agencies who get their authority to exist, funds to operate and constant regulatory guidance from Congress. Carlucci states that:

As we move forward with the implementation of the TQM process DoD wide, we will strengthen ourselves internally to make us better partners in our relationships with industry, the Congress, and the public. (Carlucci 1988, 2)

C. SUMMARY

The primary purpose of this chapter was to identify and define the fundamental management concepts of TQM. Fourteen principles were identified, of which thirteen are generally accepted by the majority of TQM experts. The final principle, termed "Congressional Interface," was added to address the political nature of establishing national policies affecting quality management in the U.S. These principles of TQM will be analyzed in Chapter VI to determine the extent of their compatibility with the elements of competition identified in Chapter IV.

VI. ANALYSIS OF DATA

A. PURPOSE

The primary purpose of this chapter and this thesis is to examine the potential benefits and the potential problems of implementing TQM in the existing competition environment. In pursuit of this objective, twelve elements of competition have been discussed, as well as fourteen principles of TQM. These elements and principles have been combined for comparative analysis in the Competition Element/TQM Principle Matrix, Table IV.

B. METHODOLOGY

The objective of the Competition Element/TQM Principle Matrix Table is to provide a logical and systematic framework to evaluate each of the competitive elements in light of each TQM principle. This table is not designed to assist in deciding if TQM should be adopted, as that decision has already been made. However, the table is intended to identify critical or potentially troublesome areas in the implementation process. This will suggest areas where TQM process action teams may concentrate their efforts, or simply consider in their planning, in order to assist in the smooth implementation of procurement improvement via TQM.

The Competition Element/TQM Principle Matrix Table was created for the sole purpose of organizing and presenting data gathered from readings, research and interviews. Table IV was not used in a questionnaire, nor was it used as a basis for conducting interviews. Interviews that were conducted were exploratory in nature. Those persons interviewed were allowed to elaborate in detail in the areas where they had the strongest convictions.

**TABLE IV - COMPETITION ELEMENT/TQM PRINCIPLE
MATRIX**

COMPETITION ELEMENT TQM PRINCIPLE	1. COMPETITION STANDARD	2. PUBLICIZING ACTIONS	3. ACQUISITION PLANNING	4. CONTRACTOR QUALIFICATION	5. PURCHASE DESCRIPTIONS	6. EVALUATION OF OFFERS	7. MAJOR WEAP. SYSTEM ACQ.	8. SUB- CONTRACTS	9. PROTEST PROCEDURES	10. SOCIO-ECON- OMIC PROGRAMS	11. STRENGTHEN INDUST. BASE	12. MAINTAIN PUBLIC TRUST
1. LEADERSHIP	-	0	0	+	+	X	+	+	0	-	+	+
2. CUSTOMER ORIENTATION	-	+	0	+	+	+	+	+	-	-	+	+
3. CONTINUOUS IMPROVEMENT	-	-	0	+	+	+	+	+	-	-	+	+
4. ROBUST DESIGN	-	+	0	0	+	+	+	+	0	-	+	+
5. VARIABILITY REDUCTION	/	+	0	+	+	+	X	X	-	-	+	+
6. STATISTICAL THINKING	-	+	0	+	+	X	X	X	-	-	+	+
7. MGMT RES- PONSIBILITY	+	+	+	+	+	+	+	+	+	+	+	+
8. QUALITY CONTROL	-	0	0	+	+	X	X	X	-	-	+	+
9. EDUCATION AND TRAINING	-	+	0	+	+	+	+	+	-	-	+	+
10. CULTURAL CHANGE	/	+	0	+	+	X	X	+	/	/	+	+
11. TEAMWORK	-	0	X	+	+	+	+	+	0	-	+	+
12. SUPPLIER INTEGRATION	/	+	0	+	+	+	X	X	/	-	+	+
13. INDIVIDUAL PARTICIPATION	-	0	+	+	+	+	+	+	0	-	+	+
14. CONGRESS INTERFACE	/	-	-	0	0	+	+	+	/	/	+	+

The symbols listed in Table IV represent a rating of the compatibility of each element of competition with each TQM principle under the present competition environment which emphasizes "full and open" competition. Each rating in Table IV represents a judgement made by this researcher as to the consensus opinion of experts familiar with the subject matter based upon interviews, research and readings. The degree of compatibility is rated using a simple five symbol system with the following meanings:

<u>Symbol</u>	<u>Meaning</u>
x	The competition element and the TQM principle are not only compatible, but there is a positive, synergistic effect. Throughout this chapter, elements and principles determined to be in this category may be described by the phrases "significantly compatible," or implementation of a TQM factor may be said to have a "very positive effect" on the competition element being discussed.
+	The competition element and TQM principle are compatible and enhance each other. "Enhance" meaning the pursuit of one has a positive effect on the pursuit of the other.
0	The competition element and TQM principle co-exist without having a significant effect on each other, or there are both minor positive and negative effects that offset each other (no net effect).

- The competition element and TQM principle are not compatible and are detrimental to each other. "Detrimental" meaning the pursuit of one has a negative effect on the pursuit of the other.

/ The competition element and the TQM principle are not only incompatible, but there is a negative, synergistic effect. Throughout this chapter, elements and principles determined to be in this category may be described by the phrases "significantly incompatible," or implementation of a TQM factor may be said to have a "very negative effect" on the competition element being discussed.

"Synergistic," as used above means that there is a multiplier effect. In other words, the effect of having a competition element and a TQM principle together is greater than the sum of the two effects taken independently.

To determine which of the competition elements are compatible with TQM, in a general sense, all the reader has to do is identify an element at the top of the form and scan the fourteen symbols in a column under that element. A predominance of X and + symbols will indicate compatibility, a preponderance of / or - symbols will indicate incompatibility. The degree of compatibility can be gauged by the proportion of significant symbols to other symbols. If one scans under the competition element and finds no x or / symbols, the reader is able to conclude that the researcher determined that this element is neither significantly compatible, nor significantly incompatible, with the TQM principles. Conversely, a single TQM principle can be examined by identifying

it in the left column and reading the symbols in the corresponding row across the chart under the competition elements.

The data is analyzed and presented in competition element order, as originally presented in Chapter IV. The analysis will consist of a discussion of the compatibility of the competition element with each TQM principle presented in Chapter V. For example, the first element is the competition standard of full and open competition. Full and open competition will be analyzed with respect to its compatibility with every TQM principle before moving on to the analysis of the second competition element. This does not imply that each TQM principle will be addressed separately. A number of TQM principles may be discussed and rated together, when the justification and level of effect are the same for those principles. In order to standardize the format of each analysis, evaluations are presented in the following order: Significantly Compatible (X), Compatible (+), No Net Effect or No Effect (0), Incompatible (-), and Significantly Incompatible (/). In a few obvious situations this format is abbreviated.

As stated earlier, this analysis compares twelve elements of competition with fourteen principles of TQM. In order to address each possible interaction between the identified elements and principles, 168 interrelationships are examined. In order to cover this material in a reasonably concise manner, less detail will be provided for combinations with less significant compatibility issues and more detail will be provided for combinations with more significant compatibility or incompatibility.

C. THE COMPARISON

The remainder of this chapter will consist of a systematic analysis of each competition element in the order presented in Chapter IV. The analysis will consist of a discussion of the compatibility of the competition element with each

of the fourteen TQM principles presented in Chapter V. Due to the fact that this analysis will consist of 168 separate evaluations (12 competition elements multiplied by 14 TQM principles), for the sake of brevity the majority of the discussion will center on elements and principles that have either very positive or very negative effects on each other.

1. Full and Open Competition (The Competition Standard) and TQM

a. Summary Results

The following is a summary of the effect of TQM principles upon full and open competition:

- (1) Very Positive Effect
 - None
- (2) Positive Effect
 - Management Responsibility
- (3) No Effect or No Net Effect
 - None
- (4) Negative Effect
 - Transformative Leadership
 - Customer Orientation
 - Continuous Improvement
 - Robust Design
 - Statistical Thinking
 - Quality Control
 - Education and Worker Training
 - Teamwork
 - Individual Participation
- (5) Very Negative Effect

Variability Reduction

Supplier Integration

Cultural Change

Congressional Interface

b. Discussion and Analysis

The heart of the concept of "full and open" competition is allowing an unlimited number of suppliers to compete for government requirements. The "full and open" competition standard is in direct conflict with many TQM principles. For example, the TQM principles of variability reduction and supplier integration require that the number of suppliers be limited.

The following is an analysis of the effect of TQM principles upon full and open competition:

(1) Very Positive Effect

None of the TQM principles have this effect upon full and open competition.

(2) Positive Effect

The only TQM principle not adversely affected by the definition of "full and open" competition is Management Responsibility. I refer here to the discussion in Chapter III concerning normal and special causes of defects in a process. It is management's responsibility to correct the special causes of defects in any system. Therefore, management's responsibility is the same under full and open competition as it would be under any other competition standard. Likewise, management's responsibility is also the same for the other competition elements. The effect is positive because this TQM principle does not allow managers to abrogate their responsibilities by blaming system failures on workers or claiming that fixing the system is "not my job."

Even in evaluation areas where competition elements and TQM are very compatible, there will still be the need for continuous improvement, and management responsibility for improving the process. Notice that all elements of competition are enhanced by the adoption of TQM with respect to the management responsibility. This can be seen on the matrix by pluses across the Table. In order to condense the remainder of this chapter, management responsibility will not be discussed as a separate item under the remaining elements of competition.

(3) No Effect or No Net Effect

None of the TQM principles fell in this category.

(4) Negative Effect

Two TQM principles that are incompatible with full and open competition, but to a lesser degree, are Transformative Leadership and Individual Participation. The "constancy of purpose" of the organization may be questioned because management is not able to fully implement TQM. However, if there is visibility of a strong effort to remove barriers to full TQM implementation and eventually some success, this may add momentum to the TQM effort. In my opinion, however, the roadblocks to full TQM implementation will do damage to the effort before significant progress is made in their removal. If the appearance of less than full support by "top management" is perceived by workers there will be a negative impact on the willingness of individuals to participate in the TQM process.

The TQM principles titled Customer Orientation, Robust Design, Continuous Improvement, and Teamwork are also negatively affected by the present competition standard. As Federal organizations become attuned to determining the ultimate customer needs and continuously improving to meet their needs, the DoD contractor will be involved in the teamwork necessary in

this effort. When more contractors are involved, the fewer opportunities each contractor will have to understand the needs of the contracting agency and the ultimate customer. For example, if there are three select contractors at a bidder's conference to go over design specifications for a new product, they will learn more about the Government's needs than if there are twenty contractors. Also, if there are twenty contractors, all twenty will be concerned about cutting every corner in interpreting the specification in order to "low ball" and get the award. Whereas with three reliable sources, each would try to maintain their reputation by not only disclosing weaknesses in the specification but by recommending the elimination of unnecessary features and including additional features needed by the ultimate customer (a more robust design). Even if the twenty contractors could make these recommendations, the Government would not have the resources to seriously consider each recommendation. By limiting input to the three best contractors, the recommendations most likely to improve the product are seriously considered.

The effort to convert the industrial base over to a statistical way of thinking, to educate and train contractors in TQM and quality control will be stymied simply because of the sheer numbers of suppliers we are dealing with under "full and open" competition. For example, a Defense Contract Management Area Office is responsible for contract administration functions, such as monitoring production, performing quality inspection, and providing small business training and assistance, for contractors in a geographic area. If the number of contractors dealing with the Government is larger due to full and open competition, then the less cooperation is provided to each contractor. Three TQM principles of Statistical Thinking, Education and Training, and Quality Control are somewhat incompatible with full and open competition.

(5) Very Negative Effect

Four principles that are significantly incompatible are: Variability Reduction, Supplier Integration, Cultural Change and the Congressional Interface. Some proponents of TQM believe that the optimum number of suppliers needed in pursuit of variability reduction is one. They conclude, therefore, that all contracts should be sole source. It is true that for a single procurement, maximum variability reduction will be achieved by using only the best quality producer. However, proposing the use of only one source in support national defense is not practical. Maintaining second sources is simply good business sense for DoD, for the following two reasons: 1) Competitive market forces not only ensure a reasonable price, but these forces, if properly channeled, may also be used to increase quality; and 2) numerous sources may be needed to ensure the uninterrupted supply of critical spare parts to ensure optimum readiness and for industrial base surge capability considerations.

The important point is to realize that the larger the number of suppliers, the greater the variability in your incoming materials, and subsequently, the greater number of defects that will be produced as a result of the use these varied materials. Also, with a larger number of suppliers generated from full and open competition, more TQM resources will be required to fully integrate the supplier base.

As discussed in Chapter V, numerous cultural changes are required when adopting TQM. Momentum is needed early in the implementation process to convince the majority of DoD employees to change in support of this effort. If the Government is not allowed to reduce the number of suppliers when it is practical to do so, then the TQM effort is simply being started with less conviction (and the effort may be seen as less sincere by those whose support is needed - the employees). This does not mean the TQM effort is doomed to

failure or that it is any less needed, it simply will take longer to achieve the cultural change necessary to institutionalize the effort.

The TQM process educates the organization about how to remove impediments expected to be encountered when implementing TQM. Unfortunately, "full and open" competition must be recognized as such an impediment. As mentioned in Chapter II, Congress' primary intent in passing CICA was to allow all interested suppliers to compete for Government contracts, and not just to reduce the prices paid by the Government for needed supplies and services. Convincing Congress that the improved efficiency and effectiveness of Government is more important than "full and open" competition will be more difficult than simply proving that TQM makes the Government more efficient and effective.

2. Publicizing Contract Actions and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the competition element of publicizing contract actions:

(1) Very Positive Effect

None

(2) Positive Effect

Variability Reduction

Customer Orientation

Robust Design

Cultural Change

Statistical Thinking

Education and Worker Training

Supplier Integration

Management Responsibility

(3) No Effect or No Net Effect

Transformative Leadership

Quality Control

Teamwork

Individual Participation

(4) Negative Effect

Continuous Improvement

Congressional Interface

(5) Very Negative Effect

None

b. Discussion and Analysis

The act of advertising in the CBD is an integral part of full and open competition. This analysis considers the act of drafting and issuing the synopsis notice. The simple fact that you advertise a requirement has little effect on the quality of the good or service received, unless of course the highest quality source does not know about the solicitation (then the notice has a positive effect) or you need the deliverable immediately (then the time delay has a negative effect).

The following is a summary of the effects of TQM principles upon the competition element of publicizing contract actions:

(1) Very Positive Effect

None of the TQM principles are significantly compatible with publicizing contract actions.

(2) Positive Effect

Publicizing contract actions has a positive effect on the TQM principle of Variability Reduction, for the following reasons. The Department of Defense is certainly interested in technological breakthroughs. Therefore,

even if there are only a few known, qualified vendors, it never hurts to find out about other sources who may have invented a better technology. Furthermore, quality improvements happen incrementally. It is not in the Government's best interest to allow incumbent contractors (those contractors previously selected to provide the goods or services) to believe their requirement may never be reopened to competition. In doing so, the Government runs the risk of the incumbent becoming complacent to the point of not improving or in fact reducing quality.

The CBD notice also, if it contains specific quality/SPC requirements, will put more vendors on notice concerning the Government's serious intention to improve quality. As contractors perceive the Government's increased emphasis on quality, they may institute quality programs to better understand quality. In this manner, the following TQM principles are positively affected, albeit indirectly: Customer Orientation, Robust Design, Cultural Change, Statistical Thinking, Education and Training, and Supplier Integration, as competing contractors strive to understand the Government's solicitation to put forth the best proposal.

(3) No Effect

The fact that you advertise has no significant effect on the following TQM principles: Transformative Leadership, Quality Control, Teamwork and Individual Participation. These TQM principles apply more to internal processes not affected by the CBD notice.

(4) Negative Effect

The drawback to the CBD synopsis requirement is the fact that it takes longer to award a contract. The contracting agency must plan better because of the longer procurement lead time (PALT). However, the farther ahead anyone forecasts, the more variability that forecast will contain due to

unknowable events. For this reason, if you subject the acquisition process to continued improvement, one of your goals would be to reduce PALT. As discussed in Chapter IV, the earliest an agency is able to award a contract resulting from a solicitation advertised in the Commerce Business Daily, in accordance with the FAR, is 51 days (at least until the law is changed). Therefore, at the present time, the publication requirement of competition generally conflicts with the Continuous Improvement principle of TQM. It must be noted that exceptions to the synopsis requirement are allowed, and for this reason this element is judged only to have a negative effect upon the continuous improvement principle.

Unfortunately one of the drawbacks of the FAR advertising requirement is that it allows more constituents to go to their Congressmen with the intent of affecting the source selection process. The Government needs Congressional support in adopting TQM principles, not Congressional interference or involvement in individual procurements. In the past this involvement has delayed contract awards and may have resulted in unwise source selection decisions, i.e. awards made for political purposes rather awards strictly based upon merit. For this reason Congressional Interface is categorized as being incompatible with this competition element.

(5) Very Negative Effect

None of the TQM principles fell in this category.

3. Competition in Acquisition Planning and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon acquisition planning:

(1) Very Positive Effect

Teamwork

- (2) Positive Effect
 - Individual Participation
 - Management Responsibility
- (3) No Effect or No Net Effect
 - Transformative Leadership
 - Customer Orientation
 - Continuous Improvement
 - Robust Design
 - Variability Reduction
 - Statistical Thinking
 - Quality Control
 - Education and Worker Training
 - Cultural Change
 - Supplier Integration
- (4) Negative Effect
 - Congressional Interface
- (5) Very Negative Effect
 - None

b. Discussion and Analysis

The FAR policy with respect to acquisition planning calls for: 1) planning for full and open competition, and 2) the integration of efforts of all involved in the process. The acquisition planning requirement obviously incorporates the definition of full and open competition, and thus has some of the same drawbacks discussed in Paragraph 1. However, the FAR policy also calls for integrating the efforts of those involved. This is fully compatible with TQM. In fact it is virtually the TQM principle of Teamwork reworded. Therefore, the

negatives and positives are considered to offset each other with respect to most of the TQM principles, as indicated in subparagraph (3) below.

The following is an analysis of the effects of TQM principles upon acquisition planning:

(1) Very Positive Effect

Although the FAR already encourages Teamwork when planning an acquisition, the amount of teamwork presently going into the Acquisition Plan (AP), is minimal. Program Offices infrequently look outside the Program Office for input into the AP preparation process. Therefore, the implementation of TQM will provide a needed emphasis and proven methods for providing the feedback needed to ensure that the Government is doing more than just talking about teamwork in acquisition planning.

(2) Positive Effect

To only a slightly lesser extent, Individual Participation also encourages more input in the AP process. The contents of AP cover a number of functional areas, such as: program, contract, logistic and financial management areas of expertise. TQM envisions individuals assuming an increased responsibility for their input into the process.

(3) No Effect

For the reasons mentioned in the introductory paragraph under this element, there is no net effect with respect to the following TQM principles: Transformative Leadership, Customer Orientation, Continuous Improvement, Robust Design, Variability Reduction, Statistical Thinking, Quality Control, Education and Training, Cultural Change and Supplier Integration.

(4) Negative Effect

Due to present FAR guidance and Congress' penchant for allowing everyone to compete for Government requirements, APs will be written emphasizing maximum competition over improved quality for some time. Therefore, the Congressional Interface is incompatible with this element.

(5) Very Negative Effect

None of the TQM principles fell in this category.

4. Contractor Qualifications and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the competition element titled Contractor Qualifications:

(1) Very Positive Effect

None

(2) Positive Effect

Transformative Leadership

Customer Orientation

Continuous Improvement

Variability Reduction

Statistical Thinking

Management Responsibility

Quality Control

Education and Worker Training

Cultural Change

Teamwork

Supplier Integration

Individual Participation

(3) No Effect or No Net Effect

Robust Design

Congressional Interface

(4) Negative Effect

None

(5) Very Negative Effect

None

b. Discussion and Analysis

When looking at contractor qualifications, the FAR allows the responsibility determination to be based, among other things, on the past performance of the contractor. In this manner the FAR permits the Government to deny the award of a contract to a poor performer. In reality, denying an award is difficult because the Government does a poor job of assessing, recording and communicating contractor performance. The point is, however, that the FAR allows the Government to pursue a TQM approach.

The concept of prequalifying contractors to assure quality is a sound idea. In Government procurement the process of developing the Qualified Bidders List, the Qualified Manufacturers List and the Qualified Product List allows us to prequalify contractors. Unfortunately, these processes are so convoluted with procedural guidelines (to ensure full and open competition) that they are useful only for commercial items, sold in large quantities to numerous Government-wide or DOD-wide activities or in major system procurements, where the complexity of the item naturally limits the number of prospective contractors wanting to be qualified. These are the only situations where the benefits to the Government outweigh the pitfalls of using the troublesome procedures. The procedures also do not lend themselves to state of the art technology, and by design cannot limit competition.

The following is an analysis of the effects of TQM principles upon the competition element titled Contractor Qualifications:

(1) Very Positive Effect

None of the TQM principles fall into this category, primarily because the Government does not do a good job collecting adequate past performance data about contractors.

(2) Positive Effect

The FAR certainly permits the Government, if not encourages them, to pursue a TQM approach with respect to this element. As the Government begins to collect statistical process control data to evaluate past performance, the following TQM principles will be positively affected, as contractors strive to demonstrate to the Government that their manufacturing processes are under control: Transformative Leadership, Customer Orientation, Continuous Improvement, Variability Reduction, Statistical Thinking, Management Responsibility, Quality Control, Education and Training, Cultural Change, Teamwork, Supplier Integration, and Individual Participation.

(3) No Effect

There is no net effect with respect to the following TQM principles: Robust Design and Congressional Interface. Prequalification procedures do not lend themselves to state of the art technology and are thus contrary to the principle of robust design. This offsets the benefit of emphasizing past performance with respect to this principle.

The use of SPC to evaluate past performance will be a catalyst in the education of the American public about TQM. This eventually may bring Congress around to TQM. However, this benefit is offset by the fact that Congress will most likely resist Government initiatives that increase the emphasis on past performance, at least in the short-term. Congress will resist because this action will limit the competitiveness of constituent businesses, especially small businesses.

(4) Negative and Very Negative Effect

None of the TQM principles fell in these categories.

5. Specifications, Standards, Other Purchase Descriptions and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the competition element of titled Specifications, Standards, Other Purchase Descriptions:

(1) Very Positive Effect

None

(2) Positive Effect

Transformative Leadership

Customer Orientation

Continuous Improvement

Robust Design

Variability Reduction

Statistical Thinking

Management Responsibility

Quality Control

Education and Worker Training

Cultural Change

Teamwork

Supplier Integration

Individual Participation

(3) No Effect or No Net Effect

Congressional Interface

(4) Negative Effect

None

(5) Very Negative Effect

None

b. Discussion and Analysis

As discussed in Chapter IV, the FAR says "specifications shall state only the Government's actual minimum needs and be designed to promote full and open competition," and continues "with due regard to the nature of the supplies and services to be required." Presently, agencies have overreacted to the call for increased competition by developing specifications to maximize price competition to the detriment of quality.

However, it must be noted that it is not the FAR that limits the Government, it is the agency's ability to express exactly what is "the Government's minimum needs," i.e. to write good specifications. For example, the Government should not tell contractors how to make a product or simply state that we need a 1/2 inch width in the Government's product. Drafting specifications in this manner results in procurement of less than the highest quality product. If the Government needs the product to be produced with a mean width of 1/2 inch, + or - 1/100 inch, and that the contractor provide statistical evidence that he reduces defects down to one in 1000 of the items produced. Then that is what should put that in the specification.

Unfortunately, at the present time, the Government will solicit and award the contract simply based upon the requirement for a first article test, i.e. the ability to produce one of the products within specification. This maximizes competition, but to the detriment of quality. The Government allows more contractors to compete, but has demonstrated little or no regard to the contractor's ability to demonstrate that his manufacturing process is under statistical control when the product is finally subjected full production.

The TQM philosophy encourages the Government to go beyond well written specifications. As explained by Deming, specifications tell the supplier nothing about the intended use of the item. It is useless to solicit a supplier for anything but the most simple product without knowing what the item was to be used for. A good supplier will try to meet your needs and not simply try to give you what you asked for. The supplier may know of a better and less expensive item that will meet the need. If the contracting personnel know what the real need is the Government can benefit from the situation. In TQM the supplier is to be integrated into the procurement process and will not have to ask an unknowing buyer what the real need is because the supplier will already know.

The following is a summary of the effects of TQM principles upon the competition element of titled Specifications, Standards, Other Purchase Descriptions:

(1) Positive Effect

In this researcher's opinion, the FAR is not restricting the Government's ability to pursue TQM with respect to specifications. Each TQM principle is compatible with the FAR guidance, and adoption of these principles will enhance the use of more effective purchase descriptions. None of the principles have a synergistic effect when adopted, however, because the actual standard should be less important under TQM. The emphasis must move towards meeting the need of the customer (the TQM quality standard), and away from meeting the letter of the contract (present quality standard).

(2) No Effect

The positive effect on industry will also eventually benefit the Congressional Interface, by increasing their understanding of TQM. However, this benefit will be offset by the fact that Congress will undoubtedly resist Government initiatives to write better specifications, at least in the short-term,

because these initiatives will be viewed as limiting the competitiveness of constituent businesses.

6. Evaluation of Offers and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the evaluation of offers:

- (1) Very Positive Effect
 - Transformative Leadership
 - Statistical Thinking
 - Quality Control
 - Cultural Change
- (2) Positive Effect
 - Customer Orientation
 - Continuous Improvement
 - Robust Design
 - Variability Reduction
 - Management Responsibility
 - Education and Worker Training
 - Teamwork
 - Supplier Integration
 - Individual Participation
 - Congressional Interface
- (3) No Effect or No Net Effect
 - None
- (4) Negative Effect
 - None
- (5) Very Negative Effect

None

b. Discussion and Analysis

The FAR guidance addressing the evaluation of offers is written with much emphasis on quality. The only exception being under the sealed bidding method, where award of the contract is based upon price or price related factors. However, by deciding that the award will be based in part on quality criteria, you simply do not have to use the sealed bid method.

The FAR allows award to the source offering the greatest value to the Government. The challenge here is to change from the emphasis on price, which by its nature is fairly objective, to equal or greater emphasis on quality, which by its nature is less objective. While the FAR says that quality may be expressed in terms of technical excellence, management capability, etc., it is difficult for the Government to evaluate these subjective concepts. It is also unfortunately easy to submit a protest and argue against a specific contract award based that has been based upon them.

The following is an analysis of the effects of TQM principles upon the evaluation of offers:

a. Very Positive Effect

Four TQM principles have the potential to significantly enhance the evaluation of offers now. They are: Transformative Leadership, Statistical Thinking, Quality Control and Cultural Change. It is within the power of present leaders to demonstrate the commitment to the pursuit of quality via the evaluation criteria set forth in Government solicitations. Furthermore, if properly written, these criteria could provide the incentive for contractors to seek out the most modern concepts of quality control in order to best address quality in their proposals. In this fashion, communication via statistics, quality control and necessary cultural change will be most rapidly enhanced.

b. Positive Effect

All the remaining TQM principles are also compatible with this element of competition. However, these principles cannot be exported to industry as easily as those just mentioned above, because they do not lend themselves as easily to be addressed in selection criteria of the solicitation.

7. Major Systems Acquisition and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the competition element of major system acquisition:

(1) Very Positive Effect

Variability Reduction

Statistical Thinking

Quality Control

Supplier Integration

(2) Positive Effect

Transformative Leadership

Customer Orientation

Continuous Improvement

Robust Design

Management Responsibility

Education and Worker Training

Cultural Change

Teamwork

Individual Participation

Congressional Interface

(3) No Effect or No Net Effect

None

(4) Negative Effect

None

(5) Very Negative Effect

None

b. Discussion and Analysis

Like other types of contracts, contracts for major system acquisition technically fall under the auspices of "full and open" competition. In reality, however, the nature of the product being purchased and its highly limited market, mean that "full and open" competition is the same as "effective" competition for major weapon systems. In essence, although the Government theoretically desires numerous competitors, they are lucky to have more than one or two serious competitors with the capability to produce the systems the Government desires.

A commonly accepted definition of effective competition involves receiving at least two independently developed offers from responsible contractors, fully capable of performing under the contract requirements. Important to effective competition is the concept of the offers being submitted in a competitive environment. In other words, each offer is submitted with the expectation of having to compete with another offer.

The compatibility, or lack there of, between major system acquisition and TQM is nearly identical to that between subcontracting and TQM. Therefore, these two competition elements will be discussed and analyzed together for convenience.

8. Subcontracting and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the element of subcontract competition:

- (1) Very Positive Effect
 - Variability Reduction
 - Statistical Thinking
 - Quality Control
 - Supplier Integration
- (2) Positive Effect
 - Transformative Leadership
 - Customer Orientation
 - Continuous Improvement
 - Robust Design
 - Management Responsibility
 - Education and Worker Training
 - Cultural Change
 - Teamwork
 - Individual Participation
 - Congressional Interface
- (3) No Effect or No Net Effect
 - None
- (4) Negative Effect
 - None
- (5) Very Negative Effect
 - None

b. Discussion and Analysis

Subcontract acquisition, like major system acquisition, operates in an environment more akin to "effective" competition than "full and open" competition. The competition standard in the FAR for subcontracts is less restrictive than full and open competition. Prime contractors are only required

to select subcontractors on "a competitive basis." The compatibility of major system acquisition and TQM is similar to that of subcontracting because both operate in the environment of "effective" competition. For this reason the two competition elements are discussed together.

When regulation allow the contracting agency to limit the number of competing concerns to two or more of the most quality conscious and qualified contractors based upon past performance, each principle of TQM enhances the competition elements with respect to major weapon systems and subcontract competition. The benefits of limited competition are very similar to those espoused by TQM experts in their single supplier scenarios.

The following is an analysis of the effects of TQM principles upon the element of subcontract competition:

(1) Very Positive Effect

Four principles in particular are significantly enhanced when limited competition is used: Variability Reduction, Statistical Thinking, Quality Control, and Supplier Integration. If an agency or prime contractor can limit competition to suppliers whose production processes are under strict control and who provide SPC documentation, then the agency can make a rational business decision concerning how much variation is acceptable for a given incoming material. In some cases it would be wise to go with the least variability. In other cases it may be wise to accept the "best value," because each vendor is well within the required standards and each product has been proven to be equally reliable in the application. In other cases it may be wise to split the award among the best quality vendors for the sake of maintaining industrial capacity. If an agency can maintain a list of qualified suppliers that have maintained documented standards of high quality, then as long as these standards are maintained, as indicated on SPC documentation, expensive and exhaustive

inspection need not be required. If an agency is able to limit the number of suppliers it deals with, then the agency can integrate these suppliers into the process that produces the weapon system. A strong signal will be sent to the Defense industry concerning the Government's view of quality. The industry will recognize that it is not simply the Government's preference that they change, but that it is in industry's best interest to change. In this manner the cultural change will be undertaken, and with "courageous patience" it should take hold.

(2) Positive Effect

All the remaining TQM principles are also compatible with this element of competition. However, these principles cannot be exported to industry as easily as those just mentioned above.

9. Protest Procedures and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the competition element of titled Protest Procedures:

(1) Very Positive Effect

None

(2) Positive Effect

Management Responsibility

(3) No Effect or No Net Effect

Robust Design

Transformative Leadership

Teamwork

Individual Participation

(4) Negative Effect

Customer Orientation

Continuous Improvement

Variability Reduction

Statistical Thinking

Quality Control

Education and Worker Training

(5) Very Negative Effect

Cultural Change

Supplier Integration

Congressional Interface

b. Discussion and Analysis

Protests delay the award of contracts, making the Government less efficient and more costly. Protests by their very nature are adversarial and sometime strain the Government-contractor relationship. Current regulations allow the Government to proceed with an award despite the filing of a protest, if the Government's needs are determined by GAO to be urgent and compelling. However, it takes time and effort to document this determination.

It is difficult to discuss the compatibility of protest procedures with TQM principles, because theoretically the filing of a protest is a symptom of a "defect" in the acquisition process. Protests are submitted by an interested party (an unsuccessful or potentially unsuccessful contractor) when they believe they have been unfairly treated with respect to an award or a proposed award. The protest ensures that the contracting action protested will be reviewed in light of their objection. In this vein, one must say that TQM principles are compatible with protest procedures because they are simply another process to be subjected to continuous improvement.

On the other hand, there is such a thing as a frivolous protest. A frivolous protest is a protest submitted that has no basis in fact. These protests obviously are not indicators that something went wrong with the acquisition

system. It is easy to submit a protest, and therefore many are simply submitted in spite, to express disagreement or disappointment in a award decision, or are submitted by contractors ignorant of the complex laws and regulations that apply to Government procurement.

Full and open competition allows more competitors to be involved in each individual acquisition, therefore, it is reasonable to expect that more protests, legitimate and frivolous, will be filed under full and open competition. Also, the move towards "best value" awards, those using more subjective evaluation criteria involving quality-related factors, will prompt more protests.

The adoption of TQM principles should reduce the number of protests submitted. For example, if suppliers were integrated more fully into the acquisition programs, as envisioned in TQM, then you would expect fewer protests from these suppliers. This would result because these suppliers objections to a solicitation would most likely be voiced and resolved informally, prior to contract award, due to their greater access to the program manager or procuring contracting officer. The use of effective competition should have the same effect because with effective competition the Government has fewer, but more integrated, contractors. Furthermore, under TQM the Government will increasingly be viewed by industry as the customer, there should be fewer protests. Under the TQM philosophy the customer's perception of quality ("best value") is quality. The supplier will not try to argue with the customer, the supplier will try to improve quality to conform to the customer's needs.

The following is an analysis of the effects of TQM principles upon the competition element of titled Protest Procedures:

(1) Very Positive Effect

None of the TQM principles fell in this category.

(2) Positive Effect

Other than Management Responsibility, where it is always management's responsibility to address "special causes" for defects, as discussed under paragraph 1 in this chapter, none of the TQM principles are compatible with protest procedures under the competition.

(3) No Effect

The negative effects with respect to the disruptive nature of protests under the competition standard of full and open competition are offset in one instance. When seeking a Robust Design, a potentially unsuccessful offeror does have the opportunity to voice concerns about overly restrictive specifications. In this manner, a more innovative design may be given an opportunity to compete. This benefit offsets the negative effect. Therefore there is no net effect with respect to this TQM principle and this competition element.

Since the negative effects of protests are primary external (affecting the Government-contractor relationship), adoption of three TQM principles which work primarily inside an organization are not affected: Transformative Leadership, Teamwork and Individual Responsibility.

(4) Negative Effect

The present protest procedures under full and open competition divert an unsuccessful contractor's attention away from improving quality, and directs their attention to an adversarial argument over who's view of quality is correct. This is contrary to TQM principles. This has a negative effect on efforts to adopt the following TQM principles: Customer Orientation, Continuous Improvement, Variability Reduction, Statistical Thinking, Quality Control and Education and Training.

(5) Very Negative Effect

The adversarial nature of present protest procedures has a very significant negative impact on two specific TQM principles. Cultural

Change and Supplier Integration are significantly impeded, particularly by the frivolous protest. Government contracting officers take their responsibilities very seriously. The protest normally accuses the contracting officer of acting in an arbitrary and capricious manner. While the contracting agency is never happy to have a contract action protested, the Contracting Officer often takes the protest as a personal insult, especially if that individual is familiar with the contractors acquisition managers. As a result there is a significant negative effect on the Government-contractor relationship, specifically, progress is not only stopped, but may be reversed with respect to the cultural change in how the Government perceives the contractor and allows him to integrate into the procurement process.

With Congress' penchant for full and open competition, the Congressional Interface is significantly incompatible with this competition element. Furthermore, despite all the above observations, even if the standard for competition were changed, or if TQM principles were well on their way to full implementation, it would be highly unlikely that laws providing the right to protest would ever be eased. In the U.S., we believe in fairness, the so-called "level playing field." The option of a legal appeal of the action of a Government agency, in this case the protest procedure, is considered a right of every citizen. The legal basis supporting this right is so deeply rooted that it is simply not practical to discuss this right being abolished or diminished.

10. Socioeconomic Programs and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the competition element of titled Socioeconomic Programs:

(1) Very Positive Effect

None

- (2) Positive Effect
 - Management Responsibility
- (3) No Effect or No Net Effect
 - None
- (4) Negative Effect
 - Transformative Leadership
 - Customer Orientation
 - Continuous Improvement
 - Robust Design
 - Variability Reduction
 - Statistical Thinking
 - Quality Control
 - Education and Worker Training
 - Teamwork
 - Supplier Integration
 - Individual Participation
- (5) Very Negative Effect
 - Cultural Change
 - Congressional Interface

b. Discussion and Analysis

It would be much simpler to make contract award decisions to either the low price or the high quality producer. It is much harder, but feasible, to determine "best value," the optimum trade-off between price and quality factors. A common feature in these two scenarios is the fact that market forces encourage companies to produce the attributes desired by the customer.

Socioeconomic programs have a different objective than that of encouraging companies to produce desired attributes. In socioeconomic

programs, certain established sources are excluded from competing for a requirement, in order to allow society's less advantaged businesses and individuals to benefit from Government procurement programs. Whereas both full and open competition and TQM try to provide the organization with the "best value" goods and services, socioeconomic programs are known to be less efficient and more costly. They were put in place to achieve other social goals.

The following is an analysis of the effects of TQM principles upon the competition element of titled Socioeconomic Programs:

(1) Very Positive Effect

None of the TQM principles fell in this category.

(2) Positive Effect

Other than Management Responsibility, where it is always management's responsibility to address "special causes" for defects, as discussed under paragraph 1 in this chapter, none of the TQM principles are compatible with socioeconomic programs.

(3) No Effect

None of the TQM principles fell in this category.

(4) Negative Effect

To the extent that socioeconomic programs may not prepare small businesses for the more intense competition in the open market, they are incompatible with TQM principles. In this researcher's opinion, tax dollars could be more efficiently spent educating and training targeted businesses and individuals to compete in the world market. Without the incentive to compete with a better quality good or service, the motivation to adopt the following TQM principles is negatively affected: Transformative Leadership, Customer Orientation, Continuous Improvement, Robust Design, Variability Reduction,

Statistical Thinking, Quality Control, Education and Training, Teamwork, Supplier Integration and Individual Participation.

(5) Very Negative Effect

Businesses, and in particular small businesses, must seek out the most innovative management techniques to attract business and survive in the competitive market. By providing contract work for targeted businesses or individuals and not integrating them into the competitive markets, we are doing them a disservice. By not encouraging the cultural change necessary for them to survive without Government assistance, we are planting the seeds for their eventual failure. Therefore, this researcher believes the present socioeconomic program structure is significantly incompatible with the TQM principle titled Cultural Change.

The majority of current socioeconomic programs target small and small disadvantaged businesses. Congress' interest in keeping their constituents happy in the short-term (small businesses have a strong lobby effort), the Congressional Interface is significantly incompatible with this competition element.

11. Maintaining the Industrial Base and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the competition element of maintaining the industrial base:

(1) Very Positive Effect

None

(2) Positive Effect

Transformative Leadership

Customer Orientation

Continuous Improvement

Robust Design
Variability Reduction
Statistical Thinking
Management Responsibility
Quality Control
Education and Worker Training
Cultural Change
Teamwork
Supplier Integration
Individual Participation
Congressional Interface

(3) No Effect or No Net Effect

None

(4) Negative Effect

None

(5) Very Negative Effect

None

b Discussion and Analysis

The industrial base is made up of the technology, management and technical skills, and facilities and capital equipment necessary to provide military supplies and services. The initial opinion expressed by many senior members of DoD is that any program that calls for a reduction in the number of suppliers must adversely affect the Defense Industrial Base. However, a discussion may ensue over whether it is better to have many, less quality conscious suppliers or fewer, but innovative and quality conscious suppliers. As indicated in recent budgets, the U.S. has decided to have the fewer suppliers when it decided to

develop fewer high technology weapon systems and to buy fewer of the systems already developed.

The TQM effort and each principle within this effort positively affects the Government's ability to maintain the industrial base. This should be no surprise as TQM is designed to reduce variability and thus reduce the number of defects caused by this variability, at every step in the weapon production cycle.

Efforts within DoD to support the industrial base must center around identifying critical technologies. TQM principles will assist the Government in gathering appropriate data and analyzing alternative courses of action to be taken to ensure these critical technologies are preserved in the U.S.

12. Maintaining the Public Trust and TQM

a. Summary Results

The following is a summary of the effects of TQM principles upon the competition element of titled Maintaining the Public Trust:

- (1) Very Positive Effect
 - None
- (2) Positive Effect
 - Transformative Leadership
 - Customer Orientation
 - Continuous Improvement
 - Robust Design
 - Variability Reduction
 - Statistical Thinking
 - Management Responsibility
 - Quality Control
 - Education and Worker Training

Cultural Change

Teamwork

Supplier Integration

Individual Participation

Congressional Interface

(3) No Effect or No Net Effect

None

(4) Negative Effect

None

(5) Very Negative Effect

None

b. Discussion and Analysis

The public trust is damaged by two events: 1) unethical behavior (waste, fraud and abuse, as it is usually referred to in Defense circles); and 2) mistakes (causing the appearance of waste, fraud and abuse).

Maintaining the public trust is the first competition element that cannot be explicitly regulated. One can argue that the FAR mandates ethical standards. One can also argue that the maintenance of the public trust is regulated via the Standards of Conduct (not only is waste, fraud and abuse a violation of these standards, but so is giving the impression of waste, fraud and abuse). However, regulation will never stop criminal behavior and is only helpful in stopping a portion of the cases where there would be an impression of waste, fraud and abuse. Mistakes in procurement will be made simply because of the volume of work and how the system is presently set up to handle that enormous workload. These mistakes, be they overpriced "toilet seats," "ashtrays," or "hammers," will continue to make the news, despite all efforts to

regulate ethical behavior. This aspect of maintaining the public trust lends itself well to improvement via TQM methods.

The TQM effort and each principle within this effort positively affects the Government's ability to maintain the public trust. TQM is designed to reduce variability and therefore defects caused by this variability. Both unethical behavior and honest mistakes cause variability and defects. TQM will continually reduce these occurrences. However, like variability itself, some unethical behavior and honest mistakes will always exist. The benefit to Government acquisition will accrue when the general public and Congress understand the difference between a "special cause" or "common cause" for the nonconforming occurrence. Then the general public and Congress will also understand that for each "horror story," the appropriate action is not to call for a new law modifying the system. If there is a "special cause" for the incident (it was unnatural, preventable and statistically predictable) then the process may need improvement. However, if the problem was the result of a "common cause" (it was natural, unpreventable and statistically predictable), then the system should be left alone.

The public's perception of the integrity of acquisition process may be different under under full and open competition and effective competition. Obviously, the ethical standards of Government and contractor personnel and the public perception of the integrity of the Federal acquisition process are equally important under both competition standards. Under full and open competition you may theoretically have less waste, fraud and abuse because so much of the process is conducted in full view of the public. However, to conclude that with full and open competition, the public perception of waste, fraud and abuse is lessened, may be premature. With full and open competition there are more losing contractors, more potential protests and court cases. While there may be

less actual abuse, there are potentially more people objecting to Government decisions, more bad publicity and a more damage to the public perception.

D. SUMMARY

This chapter examined the potential benefits and the potential problems of implementing TQM in the existing competition environment. To accomplish this examination, a comparative analysis of the twelve elements of competition and fourteen principles of TQM was conducted and the results of this analysis were presented in the Competition Element/TQM Principle Matrix, Table IV.

VII. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

Two trends of thought affecting Government acquisition were examined in the previous chapters. Background was given about the increased emphasis on competition in contracting and the twelve most significant elements of competition were described. The evolution of quality control into Total Quality Management was also examined and fourteen individual TQM principles were discussed. Finally, the compatibility of the elements of competition and the principles of competition was analyzed. The purpose of this analysis was to determine where these two trends will enhance each other, where they will conflict and where they will co-exist.

B. CONCLUSIONS

1. The TQM philosophy is a problem solving process.

It is always inviting to try and gauge the compatibility of the last major trend with that of the next major trend. It seems to be mankind's nature to enjoy watching conflict or collision. However, assessing the compatibility of competition in Federal acquisition with TQM, or assessing the compatibility of anything with TQM, is not as inviting once one has a full understanding of the philosophy. This is because there should not be any real (as opposed to perceived) incompatibilities between competition and TQM that are so great as to require an immediate change in the Government's competition procedures or prevent the adoption of the TQM principles.

The TQM philosophy is a problem solving process. In a sense it is compatible with any problem, because its purpose is to identify and solve problems. It is a fact that some aspects of the competition elements are in conflict with some of the TQM principles. However, this does not mean the TQM philosophy will not work. In fact, it means that TQM will address these problems in the normal course of business as part of the continuous improvement effort.

2. TQM is more compatible with "effective" competition than it is with "full and open" competition.

You can make the general statement that "competition" reduces costs, increases quality, increases on time delivery, and increases the trust the public has in the acquisition system. However, you cannot conclude that "full and open" competition does all these things, nor that "full and open" competition is more effective at doing these things than "effective" competition.

To the contrary, you can say that TQM also reduces costs, increases quality, increases on time delivery, and increases the trust the public has in the acquisition system and that TQM is more compatible with "effective" competition than it is with "full and open" competition.

3. TQM is simply strong leadership and good management.

At the heart of each TQM principle is common sense. The strength of TQM is how the individual elements compliment each other. The power of TQM lies in the empowerment of the work force toward a unified goal and the providing of tools and know how to the work force. It asks people to come forth with ideas and tells management how to listen to these ideas and adopt them.

4. Political decisions are usually made in the absence of data.

An important element of TQM is that decision making is based upon statistical data. Is this compatible with the political environment in the U.S.?

Even though political decisions may prevail at the highest levels of Government decision making, the likelihood (or probability) that a purely political decision will be made will be reduced when the correct decision is supported by reliable data that can be defended as objectively gathered.

An argument can be made that the unpopular/incorrect policies made by Congress are the product of political interests which were pursued in the absence of objective and commonly accepted data. TQM provides or pursues common, systematic and objective measures to provide auditable and reliable data.

In dealing with Congress, the TQM philosophy will strive to encourage a team approach. For example, a team may be created that includes industry representatives, congressional staff and DoD. The TQM training and the fact that the data was requested and analyzed by this team will give the resulting decision much more weight.

C. RECOMMENDATIONS

1. The "awareness phase" in TQM implementation needs improvement in DoD.

When authors and TQM facilitators talk about TQM like it is a "cult" or a "religion" and refer to TQM experts as "gurus," they cloud the issue. TQM puts the responsibility for defense acquisition improvement on DoD and industry. Success does not hinge on changes in congressional procedures.

Implementation methods must themselves be subjected to continuous process improvement, as well as be customized to DoD. In fact this is the area that probably needs the most attention at the present time.

Although DoD has generally taken the correct approach in adopting TQM from the top down, it is taking too long to make all DoD employees aware of TQM. There should be "general" TQM training implemented at all activities

and at each level of the organization. Specifically, TQM should be addressed at the entry school level and at the post graduate level.

2. Potentially troublesome areas in the implementation of TQM principles in the procurement process need further analysis.

Table IV in Chapter VI identifies critical or potentially troublesome areas in the implementation of TQM principles in the procurement process. It is suggested that these areas be further analyzed by TQM process action teams or simply be considered in planning procurement improvement via TQM. There are three competition elements that present the greatest conflicts when implementing TQM principles. The first is the requirement for full and open competition. The second is the observation of protest procedures. The third element is promoting socioeconomic programs.

D. ANSWERS TO RESEARCH QUESTIONS

In light of the issues discussed above, the primary research question for this study is: What are the key interrelationships between Total Quality Management and competition and how do we pursue each in light of these interrelationships?

The subsidiary research questions are as follows:

1. What principles are the basis for the management concepts in TQM?

Fourteen TQM principles have been identified in this thesis. Chapter V was dedicated to listing and explaining each of these principles. The fourteen principles are: 1) Transformative Leadership, 2) Customer Orientation, 3) Continuous Improvement, 4) Robust Design, 5) Variability Reduction, 6) Statistical Thinking, 7) Management Responsibility, 8) Quality Control, 9) Education and Worker Training, 10) Cultural Change, 11) Teamwork, 12)

Supplier Integration, 13) Individual Participation and 14) Congressional Interface.

2. What are the current Federal and DoD competition regulations and what was the Congressional intent behind them?

The most significant piece of legislation affecting competition was the Competition in Contracting Act (CICA) of 1984. CICA and other legislation affecting competition have been codified and implemented in the FAR and Department of Defense Federal Acquisition Regulation Supplement (DFARS). The FAR and DFARS are the current Federal and DoD competition regulations, respectively.

3. Where would the adoption of the TQM philosophy enhance the objectives of currently mandated Federal and DoD competition directives?

The adoption of TQM principles would greatly enhance the objectives of current competition elements in the following three areas. First, in the evaluation of offers. Second, in major weapon system acquisition. Third, in the pursuit of subcontract acquisition.

To only a slightly lesser degree, the following five competition elements would also be enhanced by the adoption of TQM principles. These elements are: 1) the synopsis of contract actions, 2) development of purchase descriptions, 3) examination of contractor qualifications, 4) maintenance of the industrial base and 5) preservation of the public trust.

4. Where would the adoption of the TQM philosophy co-exist without enhancing nor conflicting with the objectives of currently mandated Federal and DoD competition directives?

The adoption of the TQM principle calling for teamwork is fully compatible with the competition element of acquisition planning. However, this

is offset by the fact that planning for full and open competition is somewhat incompatible with most of the remaining principles, and therefore this element co-exists without either enhancing or conflicting with TQM.

5. Where would the adoption of the TQM philosophy conflict with the objectives of currently mandated Federal and DoD competition directives?

When implementing TQM principles, the greatest conflicts will be encountered with three of the elements of competition. The first is the requirement for full and open competition. The second is the observation of protest procedures. The third element is promoting socioeconomic programs.

6. What approach should be taken by DoD to implement the TQM philosophy in light of the relationships between TQM and competition?

DoD needs to promote and institutionalize quality management with the same urgency with which competition was pursued in the 1980s. Therefore, training in TQM should be DoD's first priority.

DoD should not blindly adhere to the concept of TQM type "single source" procurement. In order to maintain the public trust, fairness must be inherent in the procurement system. Even if the number of sources are limited to only those with the best quality, all interested contractors must be given an opportunity, at some point in time, to demonstrate that they have their production processes under control, and therefore, deserve the Government contract. These opportunities may arise when requirements are identified for the very first time or when mature system specifications undergo major upgrades.

Total quality management in DoD means not only properly managing our existing Armed Forces, but also maintaining our ability to mobilize in time

of war. DoD must encourage the President and Congress to establish a coherent U.S industrial policy. Therefore, in defense procurement when reduced requirements no longer make it economically feasible to maintain multiple sources, consideration must be given to industrial base considerations when making contract awards. Decisions to proceed with a single contractor must take into account price and quality-related factors, one of which must be the ability to best maintain a critical technology or capability and the surge capability essential for the national defence.

7. How might DoD adjust policy or acquisition strategy to better accommodate TQM and competition?

In acquisition planning, DoD cannot blindly adhere to the concept of price-only competition. The crux of the matter is intelligent application of competition when it makes good sense. DoD policy must be rewritten to emphasize quality as an equally important factor in every acquisition. Source selection criteria should include quality-related factors in order to achieve the "best value" for the Government. In support of these evaluations, DoD must put compatible data collection systems in place throughout the department capable of providing the information on past performance (such as percentage of on time deliveries and percentage of defects upon first inspection) necessary to objectively evaluate this quality factor.

E. RECOMMENDATIONS FOR FURTHER RESEARCH

1. Find and study activities that are in the forefront in the use of TQM in the acquisition community, particularly the pursuit of the best value approach in source selection. Publish a lessons learned manual from these activities .

2. Future research may be conducted on the implementation of the TQM philosophy with any single element of competition. Conversely, future research

may examine the compatibility of any single principle of TQM with each of the competition elements.

3. The competition elements defined in this thesis and presented in the TQM Principle/Competition Element Matrix, Table IV, assume the preference for full and open competition. Further research could be conducted on effective competition in major system, subcontract and commercial acquisition practices. With the presentation of the results of this analysis in a similar TQM Principle/Competition Element Matrix for effective competition, one could evaluate and compare the success of obtaining quality products from both effective competition and full and open competition.

APPENDIX A

THE SEVEN CIRCUMSTANCES PERMITTING OTHER THAN FULL AND OPEN COMPETITION

A. FAR 6.302-1 [Citation: 10 U.S.C. 2304(c)(1)] Only One Responsible Source (and no other supplies or services will satisfy agency requirements).

Used when the supplies or services required are available from only one or a limited number of responsible sources. Supplies and services may be considered to be available from only one source: (1) in response to an unsolicited research proposal meeting certain conditions; (2) in follow-on major system acquisitions for highly specialized equipment or services when award to another source would result in substantial cost duplication that would be unrecoverable through competition or would result in unacceptable delays. Examples of situations where use of this authority may be appropriate include: (1) when limited rights in data, patent rights, copyrights or secret processes; or control of basic raw materials exist; (2) when acquiring utility services; and (3) procurement in accordance with agency approved standardization programs.

B. FAR 6.302-2 [Citation: 10 U.S.C. 2304(c)(2)] Unusual and Compelling Urgency.

Used when urgent and compelling urgency precludes full and open competition and the Government would be seriously injured, financially or otherwise, if the number of sources is not limited.

C. FAR 6.302-3 [Citation: 10 U.S.C. 2304(c)(3)] Industrial Mobilization; or Engineering, Developmental, or Research Capability.

Used when it is necessary to award a contract to a particular source or sources in order to (1) maintain the industrial base available in case of a national emergency or mobilization and (2) establish or maintain an essential engineering, research, or development capability provided by an educational or other nonprofit institution or a federally funded research and development center.

D. FAR 6.302-4 [Citation: 10 U.S.C. 2304(c)(4)] International Agreement.

Used when the terms of an international agreement or a treaty preclude full and open competition or when the acquisition is to be reimbursed by a foreign country (such as: Foreign Military Sales).

E. FAR 6.302-5 [Citation: 10 U.S.C. 2304(c)(5)] Authorized or Required by Statute.

This authority is used when:

(1) a statute expressly authorizes or requires that the acquisition be made through another agency or a specified source (such as: Federal Prison Industries; Agencies for the Blind/Severely Handicapped; Government Printing/Binding; and the 8(a) Program).

(2) the agency's need is for a brand name commercial item for authorized resale.

F. FAR 6.302-6 [Citation: 10 U.S.C. 2304(c)(6)] National Security.

Used for any acquisition when disclosure of the agency's need would compromise national security.

G. FAR 6.302-7 [Citation: 10 U.S.C. 2304(c)(7)] Public Interest.

Used when the agency head determines that full and open competition is not in the public interest in the particular acquisition concerned and none of the other authorities apply. A non-delegable, written determination to use this authority must be made by the Secretary of Defense and the Secretary of the Navy. Congress shall be notified in writing of such determination not less than thirty days before contract award. This determination cannot be made on a class basis.

(This Appendix is a summary of Federal Acquisition Regulation Par.6.302)

APPENDIX B

ELEVEN INGREDIENTS TO THE JAPANESE RECIPE

The following list and accompanying narrative has been taken *verbatim* from Ronald Philip Dore's book *Taking Japan Seriously*; Stanford University Press, 1987, pp 12-16:

1 *The Japanese work hard* A sociologist blushes to say anything so unsubtle ... but the unsubtle is often very important. ... in all those industries in which innovation and product quality are crucial ... managers and technologists work hard - the research team nearing a breakthrough who stay in their labs until midnight for days on end, the engineer who never lets up until he has seen the last detail of a retooling off the drawing board. All sorts of both institutional and cultural characteristics lie behind this - what the Japanese have learned to call workaholism.

2 *The Japanese are well educated* Over 90 per cent of each age group stays at school until the age of 18. The typical school year contains 240 teaching days. Approaching 40 per cent of the age group proceed to college or university and a fifth of all undergraduates' degrees and a half of all masters' degrees are in engineering.

3 *Japanese work cooperatively in large corporations* This cooperativeness is manifest in such features as the Quality Circles through which manual workers contribute ideas for improvement of the production system, or the decision-making processes in management - widespread and slow consultation, a diffusion or blurring of responsibility, but swift execution of agreed decisions. The civil-service-like nature of their employment system, for all grades, may be thought to foster this characteristic: the assumption of lifetime employment as the norm, and strenuous efforts to avoid redundancies; representation of employee interest by enterprise unions which bargain under the constraint of their member's interest in the long-run health of the firm; promotion by merit along

relatively predictable tracks with minimum-seniority thresholds (so that juniors can rarely threaten to replace their immediate superiors); frequent rotation of generalist managers and technologists in the early part of their careers between production, sales, finance, design, personnel, etc.

4 *There is extensive use of subcontracting in manufacturing* This gives some advantages of specialization. The creation of hierarchies by bargaining power and status, legitimating lower wages in small subcontractors than in large corporations, also lower costs to the latter. The extent to which they reap these advantages, however, is limited by the somewhat 'moralized' pattern of relational subcontracting ... which limits freedom to squeeze subcontractors, but this drawback is seen to be largely compensated for by the guarantees of quality, prompt delivery, and rapid response to novel requirements which relational contracting can gain.

5 *Japan has a managerial, production-oriented capitalism, not a shareholder-dominated form of capitalism* Corporations until recently got a very high proportion of their capital in the form of bank loans rather than equity, and a high proportion of their equity, in the case of quoted companies, is held by the banks which finance their loans, the insurance companies which insure their businesses, their suppliers, their distributors and their customers, in other words, other corporations with a stake in the long-term health of the company.

6 *Japan has the most effective form of incomes policy outside Austria and Sweden* The whole private sector settles (by individual enterprise bargaining) at the same season with a simultaneous payrise start date of 1 April, the public sector following a few months later. The Spring Offensive system, as it is called, comprises an elaborate set of institutionalized rituals By the time enterprise bargaining begins the range of expected settlement levels has greatly narrowed, and a few big settlements by pay leaders establishes a norm that is rapidly followed, with local discounts and premia for special circumstances.

7 *Japan has a high savings rate and low rates of interest and her corporations invest 15 per cent of GNP, as do government and households combined.* Cultural ingredients in this involve prudence and the willingness to defer gratification. Other factors include: in the corporate sector, low shareholder pressure for dividend distribution and high business confidence; in the household sector, the still meagre provision of state old-age pensions and the payment of about a third of cash wages in the form of twice-yearly bonuses, as

well as the many (25 percent of the labour force) self-employed whose reserves count as household savings in statistics.

8 *Japan is still a relatively 'small government' country* The tax take has recently been around 24 per cent of national income compared with a British figure of around 40 per cent. This, however, is more a function of the low level of defence expenditure, the relatively recent arrival of affluence and the consequently low level of accumulation of social security demands, and of the scale advantages of a large population with centralized administration....

9 *Japanese corporations are very good at forming cartels ...* Japan has an impressive array of strong industry associations ... as well as sometimes providing illegal price-fixing conspiracies in fields where markets are stagnant, are also the vehicle for a wide range of concerted activities, frequently conducted under the guidance, surveillance, covert condoning, or subsidization of their sponsoring ministry - in most cases MITI. These activities include research reports ..., and recession cartels (shared production cut-backs to deal with a cyclical fall in demand). They also organize research clubs to tackle research problems of remote rather than immediate commercial significance. Japanese managers show a keenly calculative sense of where rationally to put the boundary between competition and cooperation.

10 *The Japanese value and honour the public service, and an intelligent industrial policy is one consequence of this ...* competition to enter government service is keen. Ministries - especially high-prestige ministries like the Ministry of Finance and MITI - recruit some of the most gifted members of their generation. A large proportion of them ... are from science and engineering faculties. ... This helps give MITI the respect of managers ... (t)he ability to build up a consensus about the direction of needed change in the industrial structure (periodically enshrined in publication of a forecasting document or 'Vision') provides a framework in which industrial policy initiatives can be intelligently planned and cooperatively carried out. ... Direct subsidy of these programmes has been relatively limited - a good deal smaller than British government expenditure under the Industry Act. (Also, the effective rate of taxation on corporation profits in Japan is over 50 per cent, compared with under 20 per cent in Britain.)

11 *By contrast, the Japanese do not much honour politicians, whose role in running the economy is small* Given the electoral strength of the dominant Liberal Democratic Party, in power for thirty continuous years, the only effective electoral competition is

between the factions of rival candidates for the prime ministership, and policy is rarely an issue in these contests. Politicians are more-or-less corrupt brokers for interests groups who have limited powers of veto over bureaucratic initiatives, but rarely take initiatives of their own. As ministers they need not, for example, master legislation they sponsor since bureaucrats come to the Diet to answer questions of detail at the committee stage. The consequent absence of any electoral-cycle swings of economic policy has been an important precondition for business confidence and has given time for the institutionalization of such important parts of the economic structure as the wage and price negotiation mechanisms.

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